

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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The Weston Electric Light.

After a fierce and exciting struggle which has lasted for almost two years, and the preparations for which may be said to have occupied a period of 20 years, illumination by electricity has gained a firm foothold. A calmer survey of the position reveals the fact that the exaggerated expectations of many inventors, their promoters and admirers have not been realized. Much actual improvement has rewarded the efforts of recent investigators. The history of electric machines and electric lamps shows a steady and quiet development until the period of excitement of the last few years. During the latter term, much of what earlier but obscure experimenters had brought to light was rediscovered, and much old ground was gone over. Recent progress has carried the electric light out of the laboratory of the scientist, and out of the narrow confines of the lighthouse, into a larger sphere of public usefulness. It is now acknowledged that it already occupies a ground for which it is peculiarly adapted, and there is fair promise that this range will be extended. The question has naturally been as well one of cost as of efficiency, and it is in both directions that success has been attained within certain limits. Whenever large spaces are required to be illuminated by large centers

which tends to keep them at a moderate temperature. The mode of constructing these magnets is simple and accurate. A series of thin wrought iron plates are kept at equal distances apart by a number of small pieces of iron interposed between the plates near the opposite ends. The spaces between the plates and the pieces of iron are filled with plaster of Paris, and the whole is held together by bolts. The mass of plates is then heated to redness and placed in a mold, and molten iron is poured in which fills the interstices between the plates, with the exception of the spaces filled with plaster of Paris, the use of which also prevents the warping of the plates during the casting operation. After the casting is taken out of the mold, the plaster of Paris is removed, and thus the slots in the poles in the electric magnets are secured, as indicated in Fig. 1. The same aim, that of keeping the machine cool, has been followed in building up the armature, the details of which are shown in Fig. 2. It consists of a mass of thin wrought-iron plates, which are connected by radial arms to a central hub, which is perforated to receive the armature shaft. As will be seen from Fig. 2, ample opportunity is offered to the air to enter along the axis of the armature, from which it is projected by centrifugal force through interstices between the armature plates, formed in a simple man-

ner of one of the separate coils are gathered in one cable and are connected with one commutator brush, while the respective opposite ends of each wire are connected to one binding post, to which one end of the line wires is attached. The other ends of the line wires are formed into a cable which is connected with the opposite commutator brush. By this means a separate commutator for each circuit, as hitherto employed for multiple-circuit machines, is avoided.

The armature coil is wound in two divisions, which are so wound and so connected together to the commutator that they are of like length, and consequently oppose severally the same degree of resistance to the passage of induced currents. The creation of induced rotary currents is prevented by a longitudinal slit.

Such are the main features of Weston's dynamo-electric machine, which the inventor has specially designed for use in electric illumination. The lamp used in connection with it is shown in Figs. 3 and 4, the one giving an illustration of the regulator machinery, while the other (Fig. 4) shows the lamp incased as actually used. The lamp, it will be seen, is of the general type utilizing the voltaic arc, its special feature being the regulating mechanism for maintaining the proper distance between the negative and the positive carbon rods (see Fig. 3). The

dynamo-electric machine was worked by a portable engine, the pulsations of which were approximately reflected in the movements of the lever, although the light fluctuated but little, thus showing that the construction of the regulator compensates for much of the irregularity of the current. Naturally the steadiness of a voltaic arc depends much upon the uniformity of the current, which is itself directly influenced by the fluctuations in the speed of the engine driving it. A great necessity to attain a uniform light, therefore, is an engine which works evenly and is controlled by a perfect automatic governor. Notwithstanding a lack of this necessity, we have witnessed a trial of the Weston light, during which the violent flickering observable some time since in trials in this city were considerably modified, so that some improvements of detail will entirely obviate them. The Weston lamp possesses a simple feature by which the action of the clutch movement can be adapted to every individual case. In the regulator shown, a screw is made to regulate the distance between the armature and the electro-magnet. In the latest style this has been so modified that the electro-magnet itself can be adjusted, while the armature remains stationary. By a simple mechanism, the lever operating the clutch can be made to relieve the carbon rod, so

for the illuminating power of their various styles of machines and the horse-power required to drive them:

Machine	Candles.	Horse-Power.
No. 00.....	400—600	$\frac{1}{2}$
No. 1.....	1,500—2,500	1—1 $\frac{1}{2}$
No. 2.....	7,000—10,000	3—3 $\frac{1}{2}$
No. 3.....	15,000—16,000	4—4 $\frac{1}{2}$

The figures given naturally vary somewhat with the distance of transmission and other circumstances; they all apply to single light machines; with multiple light machines the power consumed is greater. The cost of one regulator is given at \$50, while that of the machines varies from \$200 to \$1200. We need only add that a fair consumption of fuel for small steam engines may be taken at 5 pounds of coal per hour per horse-power, and that 10 per cent. will be ample for wear and tear of the machinery, to afford the main figures serving as a basis of the calculation of cost. For comparison it may be of interest to add that a 16-candle gas flame consumes 5 cubic feet per hour, the price of 1000 cubic feet being \$2. It should not be forgotten, however, that the light afforded by one large electric light cannot be as uniformly distributed as the same candle-power obtained by burning gas.

The Australian Exhibitions.—The Secretary of the United States Commission to

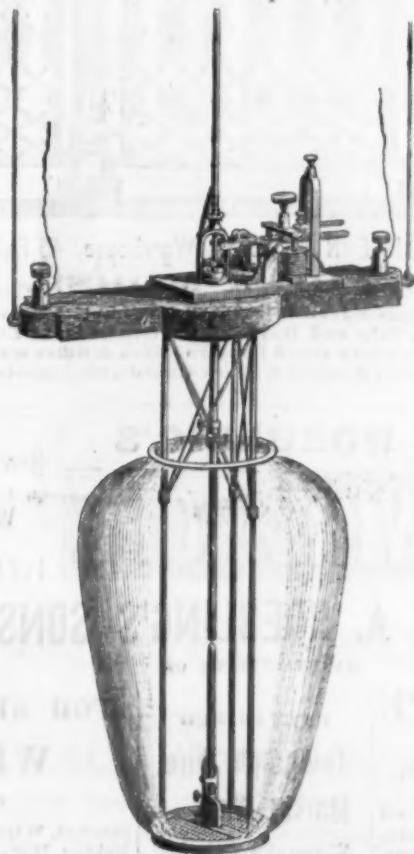


Fig. 3.—Electric Lamp and Regulator.

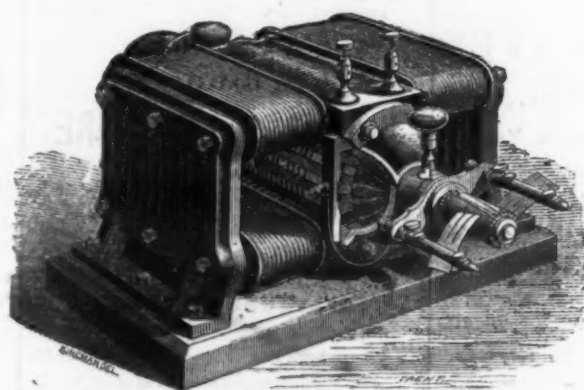


Fig. 1.—Weston's Dynamo-Electric Machine.

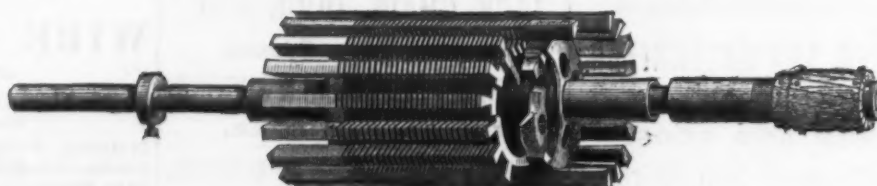


Fig. 2.—The Weston Armature.

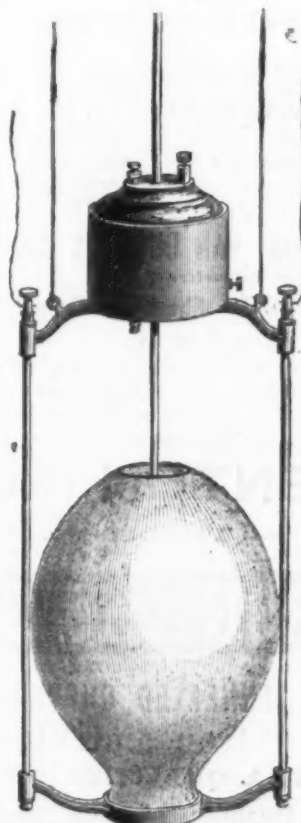


Fig. 4.—Electric Lamp.

WESTON'S DYNAMO-ELECTRIC MACHINE AND ELECTRIC LAMP.

of light, the cheapest and most efficient mode is the employment of electricity. There are, besides, numerous special cases where considerations other than that of economy may dictate its use. Into this category we may place many large industrial establishments in which night work may be made possible or more efficient. Quite a number of American electricians have sought success in this direction, the latest one on the list being Mr. Edward Weston, long and favorably known in connection with dynamo-electric machines for gold, silver and nickel plating. Mr. Weston, who has for years been quietly experimenting on electric illumination and the construction and adaptation of machinery to this end, has of late come before the public with the fruits of his labors—a perfected dynamo-electric machine and an improved electric lamp, both of which we illustrate.

As usual with improved machinery, the present shape of Weston's dynamo-electric machine (see Fig. 1) is the outgrowth of a long series of experimental inquiry. The stationary magnets are arranged in a horizontal position, which are connected by vertical bridges; the horizontal flanges permit a firm support to the foundation of the machine. Between the stationary electro-magnets revolves a circular armature, to which motion is transmitted by belt and pulley, the latter being partly visible in Fig. 1. The clearance between the electro-magnets and the rotating armature is made by accuracy of the construction of the machine to fall as low as 1-32d to 1/16th of an inch, according to the size of the machine. The commutator and commutator brushes will be seen in the front part of the machine, as shown by Fig. 1. The construction of the electro-magnets and of the armature is peculiar, one great aim of the inventor being to secure the machine from any danger of being heated while at work.

The poles of the stationary magnets are slotted, in order to afford a circulation of air,

toward their circumference. The slots in the stationary magnets and in their side bridges (see Fig. 1) afford a path to the air which, in a strong current, effectually keeps the temperature of the machine within certain limits. It is stated that a maximum temperature of 120° F. is reached after 3 to 4 hours' continuous work at high speed, and that this limit is not exceeded even after the machine has been at work 10 to 12 hours. The poles of the stationary magnets are rigidly held apart by curved brass braces (see Fig. 1) which, at the same time, afford the bearings for the armature shaft. The binding posts are arranged upon the upper curved pole—in our illustration there are only two, as the machine (Fig. 1) is only a single-light machine. With multiple circuits a correspondingly larger number is required. The commutator brushes, which are made of copper, silver-plated, are mounted on an oscillating collar (see Fig. 1) loosely slipped on the armature shaft, to which it can be firmly attached by means of a set-screw. The range of oscillation of the plate is such that the brushes may be moved from the point where the current collected by them from the commutator is of the minimum intensity, to the point where the current so collected will be of the maximum intensity. It is possible by this means to decrease the current transmitted to a lamp, until it almost approaches extinction, so that a ready means is afforded to regulate its intensity. Mr. Weston has introduced an arrangement for obtaining a number of independent circuits from one machine, which are utilized for the generation of a number of powerful electric lights. In these multiple machines, one of which has 5 lights in circuit, several separate wires are coiled around the cores of the stationary magnets, each connecting with an independent outside circuit and having an equal number of convolutions around the cores, in such a manner that they are made of equal length. The free ends

lower carbon is immovable, being firmly held in a clutch which admits of ready removal, while it holds it firmly in line. The upper carbon is attached by a similar clamp to a heavy brass rod, the weight of which tends to produce actual contact between the two points. This is prevented, or rather the distance between the points once determined upon is maintained by an automatic brake, controlled by an electric magnet. It will be seen from Fig. 3 that from a forked lever are suspended two small rods, which are attached to a hinged clutch of disk shape, through the center of which the carbon holder passes. From this disk clutch two sharp points project downward into a cup, the inner surface of which is turned into the shape of a cone. Now, it will be readily understood that as soon as the end of the forked lever is depressed the disk hinge is opened, because the projecting points strike the conical or sloping inner surface of the cup. This releases the hold of the clutch upon the rod, which slides downward, approaching the carbon points until the descent is stopped by a tightening of the clutch. The motion of the lever operating the clutch is controlled by an electro-magnet (see Fig. 3). As soon as the carbon points are too far apart the power of the electro-magnet is decreased, which relieves the armature attached to the other end of the simple forked lever, depressing the forked end. This releases the clutch and allows the carbon holder to descend until the proper distance between the two points is established. An essential point in connection with the regulator is the arrangement that the core of the electro-magnet is hollow and the armature carries two points whose extremities are conical. This has the effect of making the apparatus extremely sensitive to fluctuations of the current, or differences in the distance of the carbon points, as the action of the electro-magnet is not a violent one, but is gradual and uniform. We have observed it while operating, when the dy-

namo-electric machine was worked by a portable engine, the pulsations of which were approximately reflected in the movements of the lever, although the light fluctuated but little, thus showing that the construction of the regulator compensates for much of the irregularity of the current.

Hitherto the carbons used in connection with the Weston light were molded by hand, and though they were dense and uniform, their shape was not true, as a longitudinal seam generally revealed their method of manufacture. This system has now yielded to the use of improved appliances, which will permit the manufacture of carbons of true cylindrical shape, of a great uniformity of texture and increased density. When the latter is great, the rate of consumption is, of course, smaller, and the greater accuracy and delicacy of movement is called for in the regulator mechanism. Mr. Weston now compresses a finely divided mixture of gas retort carbon and a small quantity of material destined to increase its adhesiveness, by a powerful hydraulic press into the shape of six-inch cylinders. The latter are introduced into a strong cylinder, which can be heated by steam. The material, thus rendered plastic, is forced through a die having a diameter equal to that of the rods required, by means of a hydraulic press. The carbon is obtained in the shape of a long rod, which need only be cut up into lengths, which are slowly dried, and are then baked at a high temperature in black lead crucibles. The carbon rods thus obtained are dense and hard, and possess a metallic ring. They are given a slight coating of copper in an electroplating bath, and are then ready for use. The various sizes of carbon used are 1/4, 3/8, 1/2, 3/4 and 1 1/4-inch in diameter, their length being 12 inches, and their price 72 cents per dozen. One pair of 12-inch carbons will suffice for seven to eight hours' illumination.

The Weston Dynamo-Electric Machine Company, of Newark, N. J., who manufacture the apparatus, give the following figures

the Australian Exhibitions has issued the following circular:

WASHINGTON, July 11, 1879.
Persons desirous of forwarding articles to the Australian exhibitions at Sydney and Melbourne will receive definite information in regard to the transportation of goods by addressing Mr. R. W. Cameron, of New York, or Mr. Henry W. Peabody, of Boston, the Commissioners for the United States appointed by the Australian government to provide for the reception and transfer to the colony of the intended exhibits. Under Mr. Peabody's direction the bark Conquest will sail on July 15. Other vessels are now loading at Lewis Wharf, Boston, for various ports in Australia, freights having been placed at the lowest rates.

There are no differential duties, and all exhibits will be admitted free of duty. The Executive Australian Commissioner, F. A. Jennings, has issued a circular containing the following, which is reproduced for the information of the United States exhibitors: "Owing to unforeseen delays in the early stages of the exhibition, the notice given has in some cases left scarcely sufficient time to prepare exhibits and transmit them to Sydney for the opening in September next. Under these circumstances the Commission will receive exhibits up to the time of the closing in March, 1880, and can arrange with the Victorian Commissioners to have them sent on in time for the opening of the Melbourne Exhibition in that year."

A Competitor of the Panama Railway.—The government of Costa Rica is constructing a railroad from the Atlantic to the Pacific. It will probably be finished within a year or two, when it will vigorously compete with the Panama Railroad. Costa Rica is in a sound financial condition, the estimated revenue for the current year being \$3,000,000, and the estimated expenditure, \$1,800,000.

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SEE PAGE 9.**PHELPS, DODGE & CO.**

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Metallic Eyelets,
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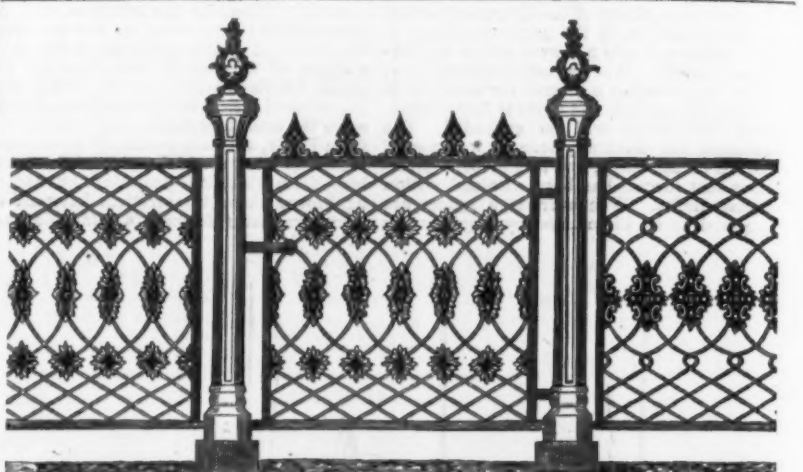
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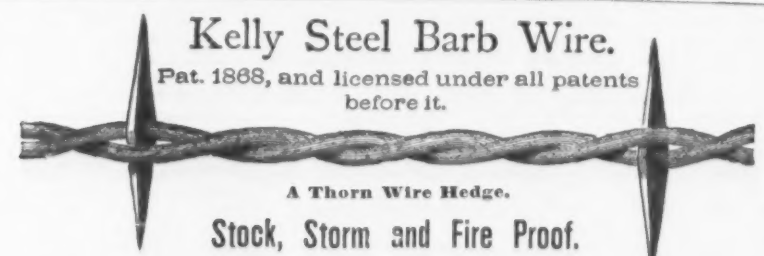
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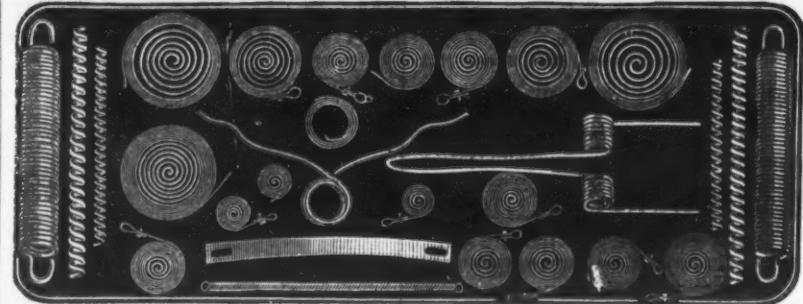
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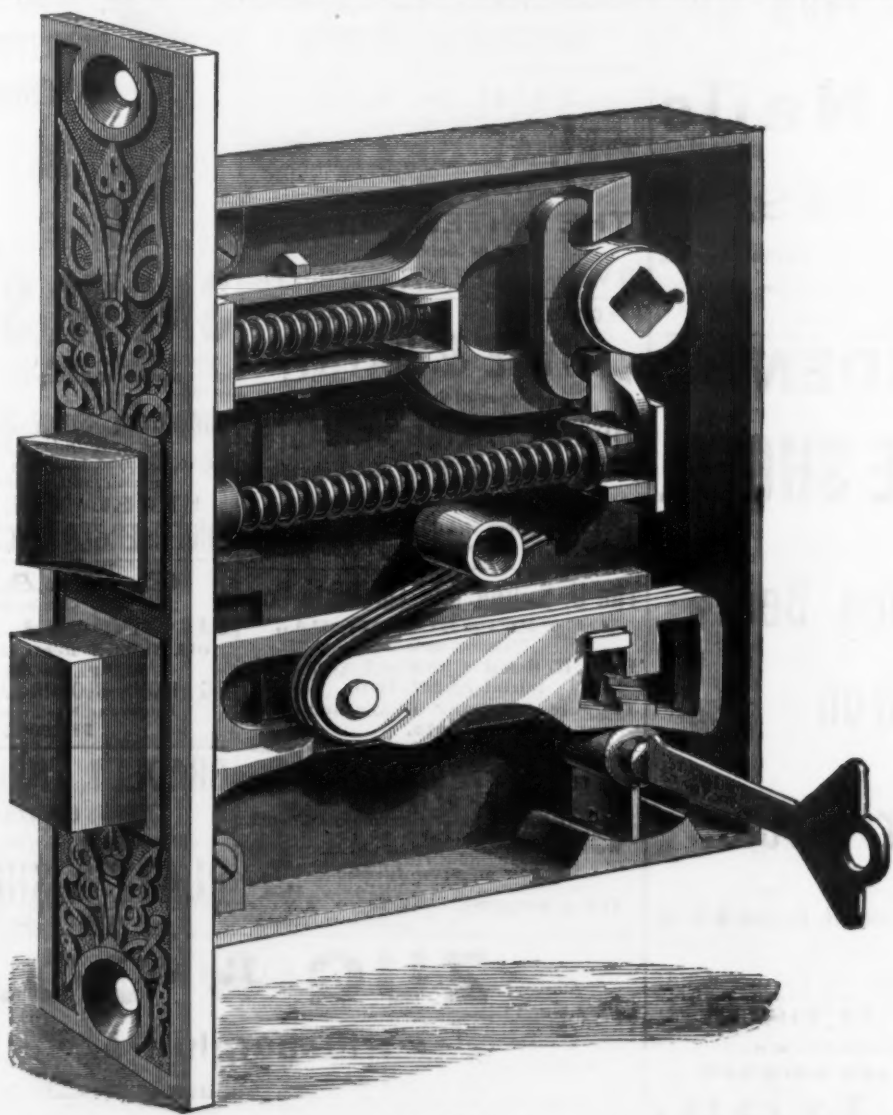
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Impurities in Iron.*

BY WM. B. CALDWELL, JR.

(Concluded.)

Gray Iron—Also called "foundry iron," is the typical "cast iron." It is a combination of iron with silicon, carbon, &c., in about the following proportions, taking No. 1 foundry iron (coke) of good quality:

	Per Cent.
Carbon	3.00
Silicon	0.75 to 1.00
Iron, per cent.	93.00
Siag, &c.	1.00

The carbon is partly "combined" and partly graphitic, the latter largely predominating as a rule in No. 1, and the two forms becoming more equally divided in the lower grade down to IV and "mottled," in which they are nearly equal; then, as the iron becomes white, the combined form predominates, graphite being absent in "white" iron, the "lowest" of the grades. There is something peculiarly interesting in this division of the carbon, not only from a scientific standpoint, considering the chemical combination of a few hundredths or tenths of 1 per cent. of carbon with the iron, and the separation of crystallization out of the remainder in the form of graphite, but also in a practical view, as this behavior of the carbon very materially affects the character of the metal, as will be shown further on.

The cause of this division, or two forms of carbon, is easily understood and explained on the supposition that molten iron absorbs a large quantity of carbon, say 3 per cent., and, on cooling slowly, the greater part of this crystallizes out. On this assumption the carbon is all combined, or partly combined and partly amorphous, in the molten metal—most probably it is all combined—for sudden cooling will, in some cases, give a metal showing only combined carbon. It has long been a favorite theory with many eminent metallurgists that the condition of the carbon in iron is greatly influenced by the temperature to which it has been subjected previous to casting, they claiming that white iron will be changed to gray if melted and heated to a point considerably above melting. In this theory the mysterious influence is "superheating," and the temperature at the time of casting is not considered. It seems to me, however, unnecessary to seek some unaccountable agency to explain the fact that the same iron may be gray or white, according to the manner of casting, when we have the plain and simple reason that sudden cooling prevents the separation of graphite. The question of heating far beyond the melting point, producing gray iron, is to my mind merely a question of giving such a heat that the iron is not ready to chill immediately on touching the mold, and therefore the temperature at the time of casting is important, while any previous overheating can have no effect. This same theory is even carried into the blast furnace practice, with the statement that high temperature there produces graphite iron by some peculiar effect of heat on the carbon—a very unnecessary hypothesis, since we know that high temperature gives highly silicious metal, and that silicon causes graphite to separate.

Gray iron is a mixture of steel and graphite, the steel being a sponge or network inclosing the graphite, and this explains the character of gray iron and the difference between gray, mottled and white, for we may consider gray iron as a low steel, inclosing graphite; mottled iron a higher steel, inclosing less graphite; white iron a very high steel, with no graphite. Now, as before mentioned, in proportion to the carbon combined with iron, it is more fusible, more brittle and harder, and we know gray iron is less easily melted, is softer and tougher than either mottled or white. These properties render it especially suited for castings, because when cast it is soft enough to be worked easily with cutting tools, being also stronger than the other grades. Another peculiarity of gray iron is that when it cools down to the point of hardening it sets suddenly and slightly expands, thus filling the mold well.

Mottled Iron—is so called from the appearance of its fracture, which shows gray specks in a white ground. It contains usually less silicon than gray iron, and also less carbon, the combined and graphitic being about equal in true mottled. Owing to a larger percentage of combined carbon, mottled iron is harder, more fusible, and more brittle than gray, and shrinks, instead of expanding, when cast. It has a peculiar property of passing through a pasty condition when melting, which adapts it especially for puddling, otherwise very little use could be made of it. This iron is made at lower temperatures than gray iron, and is less impregnated therefore with those substances which enter by reduction; but it always contains more sulphur, because the furnace, being much colder, the pyrites of the coke is not decomposed high up in the furnace, and because it is not possible to carry a heavy burden of lime on a cold furnace for fear of scaffolding. If the lime were in excess, it would carry off sulphur in the slag as sulphide of calcium; but this is still more true of white iron.

White Iron—is usually the result of a colder furnace, and contains less silicon and carbon than either of the others, which carbon is all "combined," and more sulphur. In fact, sulphur tends to prevent iron absorbing much carbon, and also to the formation of white iron. White iron may, however, be owing to the presence of manganese, in which case the carbon is high, usually 5 per cent., when manganese is as much as 20 per cent. The hardness, brittleness, lack of strength, and contraction on cooling, render white iron unfit for castings; but melting easily, and passing through a pasty condition, it is well adapted for puddling.

The more important discussion of the combined action of some of the impurities already mentioned brings up intricate questions; but there are some plain facts to be noted.

Carbon and Silicon.—In cast iron these two substances occur in large quantities, usually nearly equal in gray iron, which contains about 3 per cent. of each. The re-

duction of silicon is greatest in the blast furnace when the temperature is high, and this is also favorable to a highly carbonized metal, and as some metallurgists say, to the production of a graphitic metal; but I think it is clear that the separation of the graphite in the cast iron is not owing directly to a high temperature in the furnace. It seems that silicon and carbon replace each other to a certain extent; but a high percentage of silicon generally occurs with a high percentage of carbon, and, on cooling, this carbon separates out as graphite, in proportion to silicon percentage, so that very silicious metal, as silver gray, contains almost exclusively graphitic carbon. Why silicon causes graphite to separate is the unsettled question. It is a question which has not received the attention which it merits; and with this fact, so evident to any one who is at all acquainted with metallurgy, that high silicon and combined carbon do not occur together, there can scarcely be a question as to the action of silicon in the case. Why silicon has this effect is not easily determined; whether the separation of graphite is owing to a mere replacement of combined carbon by silicon, or to the mere presence of silicon, which acts then in some unaccountable manner, or to silicon affecting the melting point, and by keeping the metal fluid, melted sufficiently for the purpose, at a low temperature, allowing time for separation of carbon, or lastly, and very probably, to the action of silicon, preventing a sudden contraction at the moment of solidification. This fact of sudden contraction, whether by cooling or by shock, is of great importance, and exerts a powerful influence on the form of carbon. However the question may be settled by future investigation in regard to the reason of this peculiar action of silicon, the fact remains, and I think it can be safely stated:

1st. That silicon, to the amount of 3 per cent., will cause iron to be gray and highly graphitic.

2d. That without materially lowering carbon, if silicon be lowered to 1 per cent. in such an iron, it will give white iron by chilling.

3d. That any iron containing less than 1 per cent. silicon will give white metal by sudden cooling, whether it be cold-blast charcoal iron or the commonest silver gray coke metal refined.

Pig iron containing (No. 1) silicon, 4.06; graphite, 2.93; combined carbon, 0.23; gave refined silicon, 0.21, metal with graphite trace; combined carbon, 2.45; and many experiments gave similar results. These instances are sufficient to show that the use of cold-blast charcoal iron is not necessary to get a metal which will give a perfect chill, and surely lend additional weight to the other arguments in favor of the idea that silicon causes carbon to separate out as graphite. This may seem, at first sight, of but little practical moment, and yet it is of the greatest importance to one of the large industries of the country, viz., car-wheel manufacture, and the manufacture of chilled castings generally, besides the importance it has for "rolls," &c. For car-wheels, an iron is necessary that will give a hard surface when cast against iron, and a soft, strong body where cast against sand. For this, a metal containing about 1 per cent. of silicon is necessary, and that is just about what we find in the high priced cold-blast irons. Now, by refining them, the commonest, cheapest irons will answer the purpose. This is the subject of a patent taken out lately in this country, but has been in use for many years in Germany, where they refine for "rolls," and chill casting, as at Königsbütte, in Silesia, where I saw, five years ago, the operation constantly conducted of refining eight tons at a heat in about eight hours.

In this connection, there has been much discussion as to the cause and peculiarity of this property, which some irons possess, of giving a hard, white surface, or "chill," when cast against iron. Among other reasons assigned, a third form of carbon has been said to be the cause; but this third form of carbon has been found in this quality of iron (as it seems to me) merely because combined carbon was high. Treatment of carbon residue from solution of iron in hydrochloric or dilute nitric acid, and finding a substance which burns or volatilizes below redness, does not prove the existence of a third form of carbon. Carbon may be deposited in an amorphous form when iron containing only combined carbon is dissolved in acid, and the more dilute the acid, and the slower the action, the more of this amorphous carbon will be left; so that a solution in dilute hydrochloric acid, with the aid of a galvanic current, is even used by no less an authority than Prof. Bunsen, to obtain the carbon from iron, which carbon is then burned and carbonic acid weighed. A stronger acid would evolve more hydrogen, which, in its nascent state, would tend to carry off carbon as carburized hydrogen; but it rarely happens that a simple solution in acid removes all of the combined carbon, and of course the greater the quantity of combined carbon in the iron, the greater the amount of amorphous carbon left. Again, even in the mild steels, with only 0.12 carbon, it is well known that, in making color tests, the nitric acid used (1.22 specific gravity) rapidly dissolves the steel, but leaves a flocculent carbon residue, which must be dissolved by longer standing at 144° F. This residue is combined carbon, left when the acid dissolved the metal; and if the steel is very high, say 1.5 per cent. carbon, this residue, on one decigram, will be very considerable, but it will be entirely dissolved by two to three hours' standing at 144 degrees. Now, chilled iron is really a very high steel, and it seems to me that, in order to establish the theory that "chilling" is due to this third form of carbon, it must be present in any combination of iron and carbon which will perceptibly harden by sudden cooling, for steels, as well as cast irons, contain graphite and combined carbon, provided the cooling be very slow.

Chilling is not at all strange in itself; but it is as yet a mystery why silicon prevents it. The hardening or crystallization takes place in the most natural manner; in a plane perpendicular to the plane of the surface which chills or cools, just as any crystallization shoots out in a plane perpendicular to the

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For determining the constituents of a Clay, Slag, Coke, or of an Ash in Coal the charges will correspond with those for the constituents of an ore.
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FRANCIS WISTER,
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Best Coke for Furnace and Foundry Use.

surface from which it begins. If we cast from a chilling iron or high steel an inch square bar, in an iron mold, the planes of crystallization will run in to the center, forming distinct diagonal lines. The bar will be smaller than the mold, showing that there has been considerable contraction; the metal will be intensely hard, and the carbon all combined.

Wrought Iron.—The impurities are much less in this form of iron than in cast iron. It is made from cast iron, and the process, called puddling, removes silicon, and reduces carbon down to about 0.2 per cent., lowering also the percentage of phosphorus and sulphur. Being made by squeezing together small particles of iron, of course the mass is never homogeneous, and when rolled out, consists of bundles of fibers, separated by films of slag. But there are two kinds of wrought iron known in commerce, "fibrous" and "granular," the former being the truer "wrought iron," and the latter approaching steel, the difference in carbon being that the fibrous contains less than the granular. The fracture may, however, give false indication of the nature of the metal, for a good smith can bend a granular iron so as to show fiber, or break a fibrous iron so as to appear granular. In fact, the quality of the blacksmith often has as much to do with the working of an iron as its quality; but he cannot make the iron strong after it is worked. Bad iron is the result of one or several of many causes. The purest iron may be spoiled by burning or overheating, although such pure iron will stand more heat than impure irons. This "burning" is, in my opinion, not only removal of carbon, but oxidation of the metal, for if it were merely removal of carbon the iron would be softer instead of more brittle. There is also a change of molecular structure, of course. The iron "pile" or "packet" is put into a heating furnace, and soon oxidizes sufficiently to be covered with a scale. This scale, or oxide of iron, gives up part of its oxygen to carbon, taking up oxygen again from the air, and the carbon thus oxidized passes off as gas; but at the same time it is undoubtedly true that, at this intense heat, oxygen also goes to the metal, and gradually passing in, soon renders the most porous parts of the mass brittle by forming oxide of iron, which is disseminated through the mass. Therefore, the less dense the metal the more readily "burned."

There are two kinds of brittleness in iron, the one called "cold-shortness," or brittleness when cold, and the other "red-shortness," or brittleness when hot. As a rule the two do not occur in the same metal, but if the red-shortness be caused by burning, or bad puddling, leaving the iron green or badly balled, the result will be an iron both red and cold-short. Red-shortness is generally caused by sulphur, of which but a few hundredths of one per cent. will cause cracking in the rolls; but, on cooling, this brittleness will not exist. Cold-shortness is generally owing to phosphorus, which may be as much as half of one per cent. without greatly injuring the iron, provided it has been well puddled, so as to make the carbon low. Such an iron will work smooth and well in the rolls, but will be somewhat brittle when cold, and this brittleness will be greater the higher the carbon. A theory generally held by ironmasters has been, that a mixture of red and cold-short iron would give a strong neutral metal; but only in so far as dilution affects it is the theory true. Five hundred pounds each of two irons, the one containing one-half per cent. phosphorus, and the other three-tenths per cent. sulphur, will give a metal with a quarter per cent. phosphorus and fifteen hundredths per cent. sulphur. Puddling will still further purify it, and the result will be a good iron. But phosphorus and sulphur do not neutralize each other. The purification of iron by puddling should be more closely considered than it is at present; for, by properly conducted and careful work, it is possible to remove 60 per cent. at least of the phosphorus and sulphur. For this result the iron should be "bled"—that is, the slag run off before "balling." That iron may be still further purified by puddling is undoubtedly true; for, in some experiments made by Mr. J. M. Duncan, of the Roane Iron Company, Chattanooga, we puddled a heat of 1000 pounds of an iron with 0.90 per cent. phosphorus, and produced muck bar with 0.03 per cent. This would, however, scarcely be economical puddling for ordinary work, and yet, for boiler plate, would be far cheaper than "sinking" with charcoal.

Steel.—Under this heading it will be necessary to be brief, although the subject would admit of extensive treatment in detail; but our State is as yet without steel industries. As has been said before, it is difficult to say what steel is, for it is now made lower in carbon than even good wrought iron, or containing almost as much carbon as cast iron. Owing to its crystalline structure, steel bears less percentage of impurities than iron can safely carry, i. e., leaving carbon out of the question. By impurities, then, we mean phosphorus and sulphur, and the amounts of these which may be present depend largely on percentage of carbon, and also on the use to which steel is to be put. Phosphorus in small quantity, say one quarter of one per cent., does not prevent steel working well, provided the carbon be low; but when cold, such steel is decidedly brittle, unless carbon be at least as low as 0.25 per cent., and manganese should be up to 0.60 per cent. Manganese acts in more than one way advantageously to steel. It prevents, to a great extent, boiling and blowholes, by its tendency to check the oxidation of carbon during casting and while the metal is setting in the molds; it also renders less active the oxidizing tendency of the heating furnace, which would cause red-shortness; and although manganese itself renders steel harder and more brittle, it neutralizes, to a certain extent, the cold-short action of phosphorus.

In working steel with 0.30 per cent. phosphorus, 0.25 per cent. carbon, 0.80 per cent. manganese, 0.03 to 0.05 per cent. sulphur, I have found that it was soft, and gave excellent results under a steam hammer or on an anvil, cold bars 1 inch square bending completely over on themselves and sustaining repeated blows from a sledge; but the

same worked hard in the blooming rolls, and one-ton ingots cracked badly. Those ingots which rolled well gave bars which were broken by a 600-pound drop, falling 6 feet on 4-foot bearing. Lowering phosphorus to 0.20 and manganese to 0.50 gave steel which worked soft, and stood repeated blows from a 1500-pound drop falling 9 feet. In the former steel, graphite was always perceptibly present, while in the latter it was rare, and then only in minute quantity. There is a remarkable difference between the action of the hammer and the rolls on steel, more especially when carbon is high. The hammer exerts an influence similar to the cooling action of a chilling surface, producing sudden contraction, and this causes carbon to remain in the combined form, while the rolls are slower in their action, and graphite tends to separate out.

Early History of Pig Iron Manufacture in Scotland.

An interesting sketch of the early history of pig iron manufacture in Scotland has been published in a recent report by Mr. Richard Meade, Assistant Keeper of Mining Records for Scotland. While in England and Wales the earliest authentic record bearing on the production of pig iron is for 1740, the introduction of the manufacture into Scotland does not appear to reach further back than 1750. In this year the first furnace was erected at Bunawe, in Argyleshire, by a Mr. Ford; in this furnace the blast was impelled by water power obtained from the river Awe, the ore employed being brought from Ulverstone, in Lancashire, while for fuel, charcoal alone was employed, with the aid of cold blast. The Bunawe furnace, now known as the Lorne, is still in operation, the proprietors being Messrs. Harrison, Ainslie & Co., who continue to make charcoal pig iron from time to time, according to the supply of charcoal obtainable. Previous to the year 1788 there appears to have been a similar furnace erected at Goatfield, also in Argyleshire, and it is recorded that the yield of the Bunawe and Goatfield furnaces amounted to 1400 tons, or 700 tons per furnace. In these early furnaces at Bunawe and Goatfield charcoal pig iron alone was manufactured. The production of coke or coal pig iron dates from the year 1760, when the first blast furnace was put in operation at the Carron Iron Works, in Stirlingshire, where for some time charcoal was employed. Very soon, however, the powerful blowing machinery invented by Smeaton in the same year, was successfully applied and was the most complete of its kind then in use. The blowing machinery referred to consisted of four cylinders 4 feet 6 inches in diameter, exactly fitted with pistons, and so contrived that the strokes of the pistons, being made alternately, produced an almost uninterrupted blast. The pumps were worked alternately by means of a powerful water-wheel, which had four cranks upon its axis, each of which moved the piston of a cylinder through its stroke of 4 feet 6 inches. The great advantages secured by Smeaton's invention enabled the ironmasters to consume the hard dense coke in the furnace, which the ordinary bellows previously in use was unable to effect; an increased yield of the furnace was the result; hitherto it was from 10 to 12 tons per week, now it rose to 40 tons in the same period, and on the average 1500 tons of pig iron were made per annum.

The site of Carron was selected on account of the abundant water supply and the immense deposits of ironstone, coal and limestone in the immediate vicinity of the village. It was in the immediate neighborhood of Carron that James Watt, in association with Dr. Roebuck, erected his first steam engine, the patent for which was secured in the year 1769, and in that year, too, the first cannonade, the invention of Gen. Melville, was cast at Carron Foundry, from which, indeed, the new form of cannon derived its name. The manufacture of cannonades was long the specialty of the Carron Iron Works, and it was in a great measure owing to the extraordinary extent of this branch of industry during the wars that the proprietors of the works made such fabulous profits. Sir John Sinclair, writing in 1792, said that the Carron Iron Works, previously referred to, consisted of five blast furnaces, 16 air furnaces, a clay-mill for grinding clay to make bricks for the said furnaces, an engine raising 4½ tons of water at each stroke, and on an average making seven strokes in a minute (equal to 31½ tons per minute), its consumption of coal being 16 tons in 24 hours. There were three cupola furnaces; four boring mills, for boring guns, pipes, cylinders, &c.; smiths' forges for making large anchors and anvils, as well as small work of various kinds; a forge for making malleable iron, a plating forge, and a forge for stamping iron, the hammer and helve of which were both of cast metal, and weighed 1½ tons. Carron acquired its reputation for the pig iron made at the works, and for the extent, variety and excellence of its foundry products. It preceded all other iron works in Scotland in the manufacture of malleable iron.

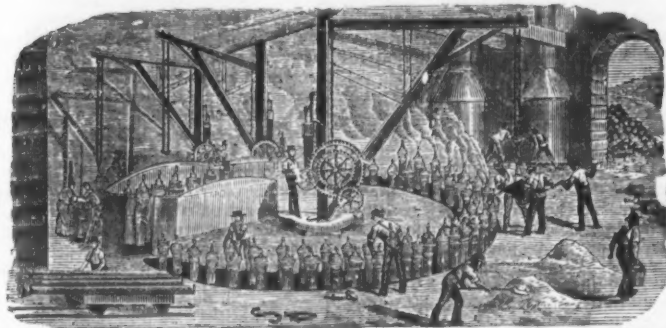
Succeeding the Carron Works, the next important seat of iron manufacture in Scotland sprang up at Wilsonston, or Clough, in the Upper Ward of Lanarkshire, near the boundary of Midlothian. It was here, about the year 1774, that the brothers Wilson, merchants, engaged in the Swedish iron trade, commenced to develop the coal deposits of the district and soon afterward established a foundry. This was succeeded in the year 1780-81, when the works were further extended by a blast furnace, the Messrs. Wilson putting their first in operation, and some years later, in 1787, blowing in a second furnace. An extensive forge was subsequently added to the already extensive works, and when, in the year 1798, Mr. John Wilson became the sole proprietor, the forge was increased, and in the year 1804 a rolling mill was erected.

In the year 1787 some gentlemen in Glasgow entered into a copartnership, and erected some very extensive iron works at Muirkirk, in Ayrshire, which were still carried on in Aiton's time by another company. The works at that time consisted of three

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TIRES AND AXLES
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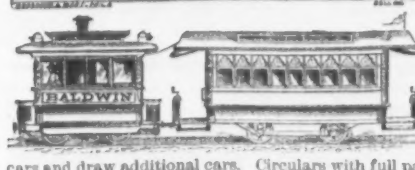
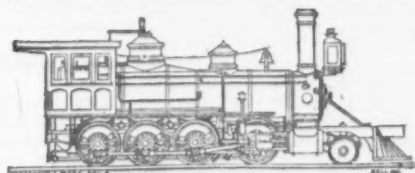
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A superior article delivered at low figures at any furnace within the district or at any point on the Ohio River. Refer to Roane Iron Co., Chattanooga Iron Co., or S. B. Lowe, Chattanooga.

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Pig Iron, Storage & Commission.
Dealer in Charcoal and Coke Pig Iron for Foundry, Forge or Car Wheel purposes.
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MADE A SPECIALTY BY
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Having extensive machine shop connected with foundry, we are enabled to fit up all kinds of light Hardware or patented articles. Correspondence solicited.

IRON AND STEEL DROP FORGINGS

All shapes, small and large, including Gun, Pistol, Wrench Bars, &c. Also, Die Sinking. Manufacturers also of Bricklayers', Moulders' and Plasterers' Tools, Saddlers' Round and Head Knives.

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MANUFACTURER OF
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And **LIGHT GRAY IRON CASTINGS.**
Castings of Best Quality made to order at short notice.



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WATERFORD, N. Y.,
Manufacturers of the **BUTTONS PATENT**

"WIRE CUTTER AND PLIER COMBINED,"
Specially Adapted for Use on Wire Fence.
Also Manufacturers of

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Price List on application. Established by DANIEL B. KING, 1859.



Earnshaw's Patent Flour Sifter (which we control and grant Licenses) covers all sifting devices combined with a Flour or Meal Scoop. This claim has been sustained in the United States Circuit Court, District of Mass., Northern District of New York and Eastern District of Michigan.
NATIONAL MANUFACTURING CO., - - 83 & 85 North Street, Boston.
New York Salesroom, 151 Williams Street.

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Plymouth, Mass.

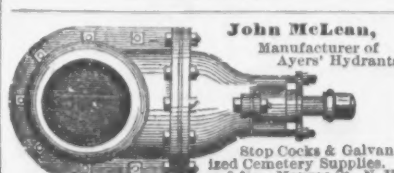
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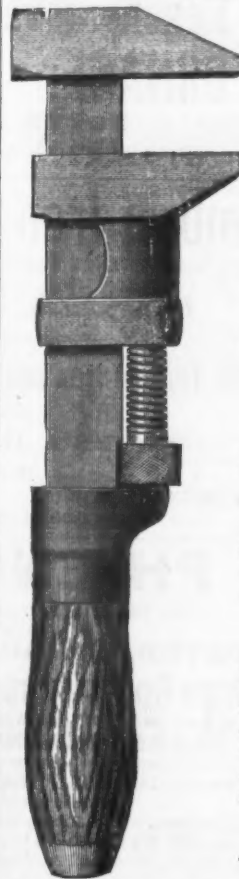
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Sizes, 1 1/2 inch 20¢; 2 inch 25¢; 2 1/2 inch 30¢ per foot, subject to large discount.
For Price Lists of all sizes of Plain and Rubber Lined Hose, address,
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Stop Cocks & Galvanized Cemetery Supplies,
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STANDARD GIRARD WRENCH.
WARRANTED.



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Durability
IT HAS
NO SUPERIOR,
GUARANTEED
IN
EVERY RESPECT.

Wrought Bar, Head and Screw.

Owing to the increased demand for these justly

Popular Wrenches, we are now manufacturing more than any other establishment in the world.

Our Wrench having been limited by other manufacturer ers, we have adopted the above Trade Mark, and will hereafter stamp all our goods.

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Both Solid and Hollow,

Ore and Clay Pulverizers, Rotary Squeezer Haskin's Patent Double Spiral Pinions, and Rolling Mill Castings of every description.

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Bridgewater Iron Co.,
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Manufacturers of
SEAMLESS DRAWN
COPPER AND BRASS TUBES,
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Forgings of every description.
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PRICE LIST.
Nos. 3 5 7 8 9 10
Per lb. 25¢ 27¢ 29¢ 30¢ 31¢ 32¢
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The following superior and well-known Lehigh Coals are mined by ourselves and firms connected with us, viz.

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Retail Yard on D. L. & W. Railroad, cor. Grove and 10th sts., Jersey City. Coal delivered direct from mines to carts and wagons. Families and manufacturers supplied with the best qualities of Coal at the lowest rates.

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MINERS' CANDLES.
superior to any other Light for Mining
Purposes. Manufactured by
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Nos. 10 & 12 Franklin St., New York.

The Largest Pump Works in the World.
OVER 800 DIFFERENT STYLES.
**PUMPS, STEAM PUMPS, ROTARY
PUMPS, CENTRIFUGAL PUMPS,
PISTON PUMPS,**
for Tanners, Paper Mills, Fire Purposes, suitable for
all situations imaginable.

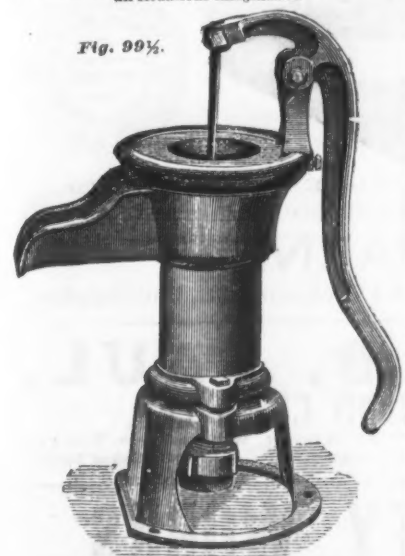


Fig. 99%.

Also, **HAND FIRE ENGINES.**
Send for catalogue. Address
RUMSEY & CO.,
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BRANCH HOUSES: 33 Liberty St., New York, and
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L. M. RUMSEY & CO., Agents, 511 North Main Street,
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cisco and Sacramento, Cal. General Agents for the
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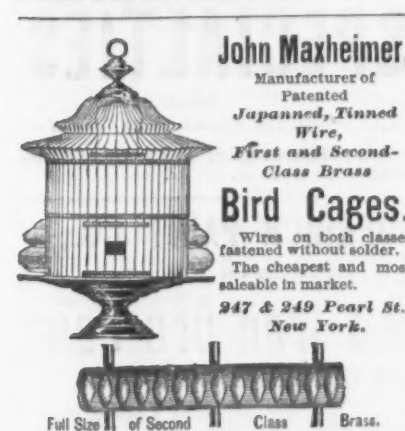


SEAMLESS COPPER PUMP.
(Pat. July 9th, 1878.)

In addition to the great variety of Iron and Brass
Pumps which we have been manufacturing for
years, we are now making a full line of **COPPER
PUMPS** under a patent granted July 9, 1878. The
Barrel and Cone are drawn in one piece. No
draining or soldering is required. Being made of
as heavy stock, they are stronger and more durable,
give a perfect valve seat, and require no repairs than
those made in the old manner. The Barrels are tested
with a five hundred pound inside pressure to the
square inch. The Spout also is seamless. Dealers
and Plumbers pronounce them far superior to any
before in the market. The inside of the Pump and
the working parts are thoroughly flamed, giving a
healthy surface for the contact with water. The
handles are finished, neatly painted and decorated
with gold bronze, the whole being a highly service-
able and ornamental article for a kitchen or the most
costly residence. Discount to the trade, 25 per cent.
No charge for Boxings. Freight paid to Boston or New
York. Orders for all varieties of Pumps filled
promptly. Please send for price list.

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For sale in Boston by Walworth Mfg. Co.
Hamblen & Matthews, Braman, Dow & Co., Eaton
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John Maxheimer,
Manufacturer of
Patented
Japaned, Tinned
Wire,
First and Second-
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Wires on both classes
fastened without solder.
The cheapest and most
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TACKLE BLOCKS.
Rope and Iron Strap of all kinds. Lig-
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Office, 113 South Street, New York.
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The Oldest and Most Extensive Manufacturers of

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HYDRAULIC RAMS,**

**GARDEN ENGINES,
Yard Hydrants, Street Washers,
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AND OTHER

Hydraulic Machines
IN THE WORLD.

Awarded the **GRAND MEDAL** at
WORLD'S EXPOSITION, Paris,
France, 1878, being the highest award on
Pumps, &c.; also the highest medals at
Paris, 1867, Vienna, 1873, and Philadelphia,
1876, accompanied by the Report of Judges.

Descriptive Catalogues and Price Lists
sent when requested.

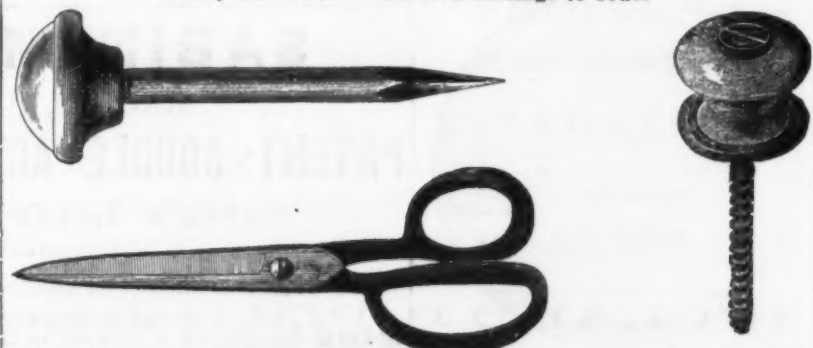
BRANCH WAREHOUSES,
85 and 87 John St., N. Y.,
AND
197 Lake St., CHICAGO, Ill.

Portable Fire Annihilator.
Fig. 279.



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MANUFACTURERS OF
Upholsterers', Stationers', House Furnishing and Fancy Hardware
AND NOTIONS.
Fancy Brass Goods and Iron Castings to Order



Picture Nails, Knobs and Hooks, in great Variety. Gilt and Tinned Picture
Wire, Twisted and Braided.
American Cast Shears,
Sold by Hardware and Notion Dealers everywhere.
Also Manufacturers of Shade Fixtures and Trimmings, Ink Stands, Twine Boxes, the Celebrated
"Family" Egg Beater, Nutmeg Graters, Escutcheon Pins, Curtain Rings, &c., &c.
FACTORIES, Wolcottville, Conn.

ESTABLISHED 1848.

C. T. DRAPER & CO.
Sole Sing. N. Y.
Manufacturers of SUPERIOR
HAND CUT
FILES and RASPS
Made from Best
ENGLISH CAST STEEL.
Quality guaranteed by written warranty
when required.



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Brass & Copper
TUBING,
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PHILADELPHIA.**

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Gilbert & Bennett Mfg. Co.,**
GEORGETOWN, CONN.,
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**IRON WIRE, SIEVES AND
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Galvanized Twist Wire Netting,
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ROTARY, FLOUR AND MEAL



SIFTER
Scoop, Measure, Mixer, Weigher, Egg
Beater, Rice Washer, Tomato, Starch,
Wine and Fruit Strainer.
Guaranteed the very best, and the cheapest
to the jobbing trade. It commands itself where-
ever shown. **WRITE FOR PRICES.**
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Lantern and Sieve Manuf'rs. CINCINNATI, O.

One of the Best Selling Inventions in
the Market.
**Dubois' Patent
RULE GAUGE.**
Having introduced my Rule Gauge, and finding
it meets the wants of Carpenters and Mechanics,
and is appreciated by them, thousands having al-
ready come into use all over the country, I am
now prepared to supply the trade at a liberal dis-
count.
Send for descriptive circular and price list to
M. N. DUBOIS, Manufacturer,
891 Cherry Street, PHILADELPHIA.

large blast furnaces for making pig iron, an
extensive forge for making bar iron, with
a foundry and other accessory works, the
number of hands employed in the above
works at that time amounting to from 300
400; while the mineral field of the Muirkirk
Company at the time referred to exceeded
2000 acres of coal and ironstone. The
works still exist, and the iron there manu-
factured has a high reputation. It is stated
that very early in its history it became
famous for its bar iron, which was little, if
at all, inferior to Swedish iron. In the year
1796 there were two blast furnaces at these
works, in which year 2878 tons of pig iron
were made. In the year 1788 the Omoa Works
in Lanarkshire, which were dismantled only
a few years since, commenced operations.
In the same year the Clyde Ironworks, near
Glasgow, were projected by the Messrs.
Edington & Co. These latter works have
been rendered famous by being associated
with two names celebrated in the
metallurgical industries of Great Britain—
the one Mr. David Mushet, the other Mr.
James Beaumont Neilson. The first named
entered these works as accountant in the
year 1792, when he was 19 years of age, and
remained till the year 1800. In the follow-
ing year, while engaged in the projection of
the Calder Ironworks, in association with
Mr. William Dixon, Sr., of Govan, Mushet
made the discovery of the blackband iron-
stone, which in subsequent years exercised
such an important effect in promoting the
prosperity of Scotland in her metallurgical
and associated industries.

In 1788 the pig iron production of Scot-
land was 7000 tons, of which 1400 tons were
charcoal iron. In 1796 it had reached
16,086 tons (of which only 900 tons were
charcoal pig), made in 17 furnaces, which
were distributed as follows: 4 at Carron,
3 at Clyde, 2 each at Wilsonstown, Muir-
kirk, Omoa and Devon, and 1 each at Goat-
field and Bonawe.

In 1792 Messrs. Roebuck and Longridge
built the Devon Iron Works, in Clarkman-
nanshire, to which a special interest at-
taches. These works originally had three
blast furnaces cut out of the solid rock and
lined with fire-bricks, and provided with the
largest air chamber ever used in an iron-
works. This chamber was also excavated
out of the solid rock. It appears that at
these works, between the years 1848 and
1854, the late Mr. Alexander Christie
labored most assiduously to accomplish the
utilization of the gas produced in a furnace
using raw coal. He was successful, but his
success was gained at the quality of the
iron. The Devon Iron Works have long since
been dismantled. In 1802 the Shotts Iron
Works were projected under the able man-
agement of Mr. John Baird, of the Canal
Basin Foundry, Glasgow, who continued to
be the managing partner of the concern for
upward of 40 years. At these last-named
works, in late years, it appears Bessemer
pig iron is produced from hematite ore and
the use of raw coal. When built, the fur-
nace was one of the largest producers of
pig in Great Britain, making 2000 tons of
iron per annum. The returns for 1806 show
that the Scottish iron trade entered the pre-
sent century with an equipment of 27 fur-
naces, 13 of which, in the year named,
produced 22,840 tons of pig, while England
at the same period, blowing 161 furnaces
out of 216 built, produced 24,385 tons. Such
was the modest beginning of an industry
which in 1870 contributed 1,206,000 tons
toward filling the world's demand for pig
iron. Since then production has shown con-
siderable fluctuation, but has never reached
the maximum of that year. The recent re-
port of the British Iron Trade Association
gives the following figures, the first column
showing the number of furnaces in blast,
and the second the make in tons:

1870	126	1,206,000
1871	126	1,160,000
1872	115	1,093,000
1873	123	997,000
1874	121	806,000
1875	124	1,050,000
1876	110	1,103,000
1877	84	982,000
1878	92	902,000

The New Postal Regulations.

In our issue of May 8 we gave a summary
of the changes effected in the classification
of mail matter by the New Postal law,
passed March 3 and which went into opera-
tion on the 1st of May. As these changes
largely affect the mercantile, insurance,
and other interests, and as they are at
present but imperfectly understood, the
subjoined detailed information upon the
subject has been obtained through inquiry at
the Post Office. It may be relied upon as
being in accord with the latest official rul-
ings and decisions of the department, and as
absolutely correct. The rate on commercial
papers, insurance documents, papers in legal
proceedings, &c., when partly in print and
partly in writing, has heretofore been the
same as on letters, viz., 3 cents per half
ounce. All such articles have now, with the
exceptions mentioned, been assigned to the
third class of mail matter, and as such are
chargeable with postage at the rate of 1 cent
for each two ounces when sent in unsealed
envelopes or wrappers. The exceptions are:
If such articles contain writing in the nature
of personal correspondence, or are in them-
selves the representatives of a monetary
value. In these cases they become first-class
mail matter, and as such are chargeable
with letter rates of postage. According
to the latest rulings of the department
(which reverse a number of those recently
made under the same law), the specific
examples of the exceptions to third-class
matter are: Insurance policies signed and
in force, daily insurance reports, insurance
transfers, notices of premium due, assign-
ments, transfers, applications for insurance,
promissory notes, attached to premiums or
not, and all notices from local agents to
policy holders respecting renewals, cancella-
tions, receipts, or other kindred matters;
also, all signed notes, checks, drafts, deeds,
bonds, bills of lading, receipted bills, and
signed receipts of all kinds. Insurance
policies, canceled or incomplete; unre-
ceipted bills, invoices and monthly state-
ments may all be sent at third-class rates of
postage.

The former restrictions as to writing in
books have been removed, to the extent of
permitting a simple manuscript dedication,

or form of presentation, to be written on the
covers or blank pages. Manuscript for pub-
lication, when accompanied by proof-sheets,
may be sent at third-class rates; but unless
so accompanied, is chargeable at letter
rates. Architectural and other drawings
made by hand, heretofore charged at letter
rates, are now assigned to the fourth class,
and may be sent on payment of postage at
1 cent per ounce, as may also original paint-
ings in oil or water colors, &c. Chromos
are rated as third-class matter, unless
mounted on cloth or pasteboard, in which
case they belong to the fourth class. Post-
age and revenue stamps are now in the
fourth class.

Articles of glass, formerly excluded from
the mails, may now be sent at fourth-class
rates (one cent per ounce), provided they
are secured so as to guard against injury to
other mail matter in case of breakage, and
are boxed in accordance with certain in-
structions contained in the United States
Postal Guide. Original packages of tobacco
and boxes of cigars, and other articles sealed
by internal revenue stamps, which were
formerly charged at letter rates, are now
placed in the fourth class by a decision of
the department, which states that they
"will regard the stamp placed over the
cover or opening of such packages as evi-
dence that no matter is contained therein
which is subject to letter rates of postage."

All persons who desire to avail themselves
of the concessions noted above will under-
stand that they involve certain drawbacks.
For example, with the single exception of
the packages sealed by internal revenue
stamps, all mail matter not sent at letter
rates must be left open to inspection by the
Post Office authorities. No articles other
than letters and postal cards can be re-
turned to the senders on request, nor for-
warded to other offices, unless again fully
prepaid; in case the persons addressed have
removed; nor can they be advertised; but
if found undeliverable or uncalled for, they
will be sent to the Dead Letter Office. Mail
matter of the third and fourth classes is not
assorted and put up with, or in the same
manner as, letters, being placed loose in
canvas sacks and not in locked pouches;
and of course whenever it is necessary, on
account of unusual accumulation of mail
matter or for other reasons, preference in
dispatch is always accorded to letter mail.

Cements, Mastics and Concretes.

Many of our readers have occasion to use
cements or mastics, especially in putting
down cellar floors or making old walls tight.
They will find the following hints upon the
subject valuable:

A cement of one part sand, two parts
ashes and three parts clay, mixed with oil,
makes a very hard and durable substance
like stone, and is said to resist the weather
almost like marble.

Damp brick walls are common, especially
in houses in the country where they are ex-
posed upon the north and east sides. So
common is this that, in many places in the
country, a strong prejudice exists against
brick houses on account of their constant
dampness. Last year a gentleman having
a brick house exposed on all sides, and suf-
fering from dampness in the kitchen, which
was in a wing upon the most exposed side,
tried an experiment which has proved very
satisfactory. A barrel of the best English
Portland cement was purchased, and a
common tin wash basin used for mix-
ing it. The cement was mixed with water
till about the consistency of cream, and
then applied thickly with a large paint
brush. Of course the mixture had to be
constantly stirred to prevent the cement
from settling to the bottom. And on ac-
count of its very rapid setting it could
only be mixed in very small quantities; half
a gallon is about as large a quantity as can
be readily handled at a time. When first
dried it seemed somewhat of a failure, be-
cause it could be so easily brushed off, but
after it had had 24 hours to harden it formed
a strong, durable coating. The color is a
neutral tint, somewhat like Ohio stone. This
coating kept the wall perfectly dry, and as
it is not expensive and does not need skilled
labor in its application, ought to be exten-
sively used. We do not know just what
Portland cement (English) is worth at the
present time, but the last quotation was
about \$3 per barrel in New York. The gen-
tleman who put on the cement suggests that
a damp or foggy or misty day is best for its
application. The coating should be brushed
into all the crevices and openings of the
work, and it may be found desirable to apply
two coats in order that all the openings, &c.,
may be completely closed.

Cement is much stronger than mortar,
and can be used to great advantage in many
places instead of lime, even in the face of
the fact that it is much more costly than
lime, except in a few favored localities where
it is made. The usual proportions are 1
part of the hydraulic lime to 5 of sand. In
pointing, the proportion is sometimes as low
as 3 parts sand to 1 of the hydraulic lime or
cement. Coarse clean sand—almost pebbles
—can be used to the extent of 3 parts to 1
of the cement. Some advise mortar, to be
allowed to set and then wet and worked
again. This course will not answer with
cement, which is greatly injured by such a
method of working. The greatest enemy of
both mortar and cement is the frost. The
power with which water expands at the
freezing point is practically unlimited, and
where it penetrates into the crevices and
pores of mortar and freezes, or when wet
mortar is allowed to freeze, its strength is
destroyed.

For making floors, the following method
is said to produce very desirable results:
Four parts coarse gravel, or broken stone
and sand, and 1 part each of lime and ce-
ment, are mixed in a shallow box, and well
shoveled over from end to end. The sand
gravel and cement are mixed together dry.
The lime is slaked separately and mixed
with just mortar enough to cement it well
together. Six or eight inches of the mix-
ture is then put on the bottom, and when
well set another coating is put on, consisting
of 1 part cement and 2 of sand. This will
answer for making the bottom of a cistern
that is to be cemented directly upon the
ground without a lining of bricks. This
will also form a very good cellar floor.



USE THE BEST.

NEW



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NEW AMERICAN FILE CO., Pawtucket, R. I.

AUBURN FILE WORKS,
Superior Hand-Cut
FILES AND RASPS,
MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.
FULLER BROS., Sole Agents,
89 Chambers and 71 Reade Streets, N. Y.



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PENNSYLVANIA FILE WORKS,

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Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

Superiority acknowledged wherever used, sold or exhibited.

TENNIS & WILSON,
80 and 82 Reade Street, NEW YORK.



THE PATENT PARAGON FLY TRAPS

The Best in the Market.

Price Lists mailed on application.

SNELL MANUFACTURING COMPANY,

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MANUFACTURERS OF

Angular and Upright Boring Machines,
Boring Machine Augers,
Solid Cast-Steel Carpenters' Augers,
Extra Cast-Steel Auger Bits,
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Phoenix Superior Cast-Steel Auger Bits,
Screw-Drive Bits,

Taper Pod Gimlets,
Taper Pod Gimlet Bits,
Countersink Gimlet Bits,
Long Millwright Solid Cast-Steel Augers,
Long Rafter Solid Cast-Steel Augers,
Coopers' Dowelling Bits and Boat-Builders' Bits,
And all kinds of Machine Bits made to order.

RIPLEY MANUFACTURING CO.,

Unionville, Conn., U. S. A.



BEST PORCELAIN-LINED LEMON SQUEEZERS.

"Common Sense" Mouse Traps.

HAND-MADE ROSEWOOD FAUCETS.

Housefurnishing Hardware.

FOR HOME AND EXPORT TRADE.

BAEDER, ADAMSON & CO.,

Manufacturers of SAND & EMERY PAPER & EMERY CLOTH.

(Also in Rolls, for machine work.)

Ground Emery, Corundum & Flint, Clue & Curled Hair, Hair Felt, & Felt-
ing for Covering Boilers, Pipes, &c., Cow Hide Whips.

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BOSTON, 143 Milk St. CHICAGO, 182 Lake St.

Read by the hardware



"DRAW CUT" BUTCHERS' MACHINES.
Choppers, Hand and Power Stuffers,
Lard Presses,
Warranted thoroughly made and the Best in Use.
MURRAY IRON WORKS,
Burlington, Iowa.



BARBER'S PATENT COUNTERSINK.
Diploma awarded at Mechanics' Fair, Boston, 1878. Hole bored any depth, and countersunk for any size screw at one operation. \$2 per doz.; discount in quantity. D. F. BARBER, 1321 Washington St., Boston.

FILES & RASPS,

HAND-CUT. Manufactured by
JOHNSON & BRO.
No. 1 Commercial Street, Newark, N. J.

SPENCER & UNDERHILL,

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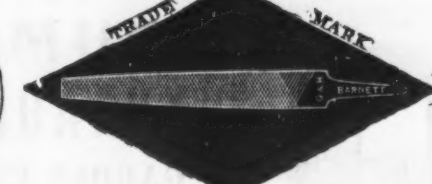
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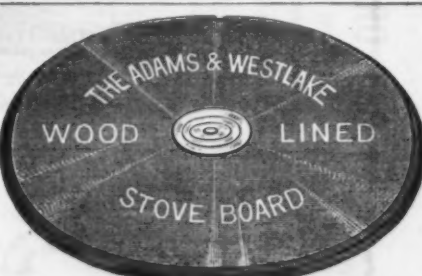
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Iron and Steel for High-Pressure Boilers.

A valuable paper, embodying a large series of suggestive experiments, was read by Messrs. David Greig and Max Eyth, of Leeds, before the British Institution of Mechanical Engineers. The principal object was to ascertain the relative value of mild steel and iron as employed for high-pressure boilers of the ordinary portable or traction engine type, the main question at issue being to determine experimentally the best means of forming the strongest riveted joint. The first set of experiments had reference to the shearing resistance of rivets, the material of which yielded the following average results by tests for tensile strength: Breaking strain, per square inch—Steel, 64,579 lbs.; iron, 49,795 lbs. Reduction of area—Steel, 30.1 per cent.; iron, 42.03 per cent. Elongation in 10 inches—Steel, 2.06 inches; iron, 2.78 inches—which shows an increase of steel compared to iron of 30 per cent. With these materials shearing tests were made in an apparatus in which the specimens (3/4 inch in diameter) were subjected to double shear. The steel showed an average shearing resistance of 49,683 lbs. per square inch—only 17 per cent. higher than that of the shearing resistance of the iron rivets, which yielded at 42,582 lbs. This explains how it is that, in the test pieces representing riveted seams subsequently to be described, the steel specimens, as a rule, broke by shearing of the rivets, and the iron by tearing the plate through the holes. It is also worth noting how far from the truth is the rule so frequently adopted, which assumes the tensile resistance of iron or steel to be about equal to the shearing resistance—at any rate in cases of double shear. In the present case the latter proved far less than the former—in the case of iron by 16 per cent.; in the case of steel by 28 per cent.—showing, besides, that the shearing resistance does not bear any fixed proportion to the tensile resistance.

Another point deserves consideration. It will be seen subsequently that the actual shearing resistance of the joints had nothing whatever to do with the practical strength of the boiler, the joints leaking under a pressure far below that which could have broken them, and to a degree which made the boiler absolutely valueless. This leakage was mainly due to the compression of the rivet and to the elongation of the hole, which both combined to cause the rivet hole to open. The former is well shown after the burr left after shearing in the hole of the central plate of the shearing apparatus above described. These burrs, which of course would originally be circular, have assumed an elliptical shape. The reduction of the diameter in the direction of the strain was for iron and steel as nearly as possible the same, viz., 0.031 inch, after exposing them to the maximum shearing strain in each case, viz., 19 tons per square inch for iron and 22 tons for steel. There can scarcely be a doubt that in this respect the application of a somewhat harder material would prove advantageous.

The next step was to investigate the shearing resistance of single rivets actually formed. A very interesting comparison of the results of hand, steam and hydraulic riveting is given in this connection, which we reserve for future consideration. It may suffice at this juncture to state that the superiority of riveting by machinery over hand riveting has been again demonstrated, while the experiments have shown that steam riveting is inferior to hydraulic riveting so far as the quality of the rivet is concerned, but that hydraulic riveting is superior as to its effect on the plate.

The average shearing resistance of the rivets was 46,592 pounds for iron and 59,912 pounds for steel for 3/4-inch rivets, inserted into 11-16-inch drilled holes. From other experiments the interesting fact was gleaned that the average breaking strain of 3/4-inch steel rivets was 40,544 pounds, while the mean shearing resistance was 36,885 pounds, which proves that 3659 pounds were owing to frictional resistance. Messrs. Greig and Eyth then describe and illustrate a long series of tests made with riveted lap-joints. The tests of the solid plates themselves showed their average tensile strength to be 49,840 pounds per square inch for iron and 57,792 pounds per square inch for steel, the latter of which contained from 0.131 to 0.71 of carbon, 0.018 to a trace of silicon, 0.066 to 0.112 of sulphur, 0.048 to 0.073 of phosphorus, and 0.50 to 0.57 of manganese, being fully 16 per cent. higher than the former. The steel is pronounced to be too mild, and it is claimed that the harder the steel can be made without becoming brittle, the more effective will it be for boiler work. The shearing strength of the rivets used was for iron 15,810 pounds, and for steel 18,440 pounds for a section 11-16 inch in diameter. Comparative tests were made with riveted specimens, to ascertain the merits of punched and drilled joints both for iron and steel. The breaking strain of the drilled iron specimens was 50.4 per cent. of the strength of the solid plate; that of the iron between the rivets was 84.1 per cent. of the nominal breaking strain, which confirms Mr. Adamson's theory of the flow of force around a hole. The shearing strain of the broken rivets was 103 per cent. of the previously ascertained shearing strain of the rivet iron. The punched specimen broke through the plate at a strain which was only 40.6 per cent. of that of the solid plate. Thus it is seen that punching iron is unfavorable to the plate, while it was shown to be favorable to the rivets. With double-riveted lap-joints iron plates developed a strength of 64 per cent. of the strength of the full plate, while with the steel samples the strength of the seam rose to 70 per cent. Iron butt joints broke in the plate at a strain which was not higher than that to which the ordinary lap joint had been subjected, thus proving that the seam is not in any way strengthened thereby. The steel samples sheared through the rivets, their strength being 56 per cent. of the solid plate. Double riveting, it was found, did not yield any noticeable advantage, but, on the other hand, it was shown experimentally that butt joints with double covers, which break through the plates, are much stronger, partly because all bending of the plates is

avoided, and partly because there is greater frictional resistance between the plates.

Messrs. Greig and Eyth then proceeded to make a number of tests of stayed ends, with the object of determining whether there was any danger of bulging in high-pressure boilers stayed in the usual manner. They constructed three drums representing a fire-box side with its stays, one being made entirely of steel, the second of iron and the third of steel, with check nuts at the ends of the stays on the side of the weaker plate; each was subjected to hydraulic pressure. One end plate was 3/4-inch plate, representing the inside of the fire-box; the other, corresponding to the outside shell, was 9-16-inch; the stays were 3/4 inch in diameter, 4 1/4 inches apart, and were tapped right through. The clear space was 2 1/2 inches inside. In every case the breaking of a stay concluded the experiment, the iron barrel failing at 1230 lbs., which showed that the riveted head gave way at 12 per cent. below the breaking strain of the stay. Exactly the same result was obtained with the steel barrel, which yielded at a pressure of 1628 lbs., 12 per cent. below the maximum tensile strength of the stay. It would appear, therefore, that the stays in high-pressure boilers as usually employed are so weak that no serious bulging takes place before the stays break.

The longitudinal boiler barrel was next investigated; three, of 3 feet length and 2 feet 11 1/2 inches in diameter, were submitted to hydraulic pressure. An iron barrel with punched holes could not be made to hold 450 lbs., as it leaked badly along the longitudinal seams. The next step was to test complete boilers. An iron boiler with drilled holes and a single lap weld commenced to leak at the longitudinal seams at a pressure of 420 lbs. per square inch, while the steel boiler (the barrel of which alone stood 490 lbs.) permitted with ordinary caulking as much as 520 lbs., and a maximum of 620 lbs. was momentarily attained. With a double-riveted steel barrel 650 lbs. were admissible, or 65 to 70 per cent. of the actual tearing strain of the rivet. The complete boilers above mentioned were carefully measured at different points for different pressures, in order to ascertain the amount of bulging. The conclusions drawn by the writers gives a concise and lucid résumé of their experiments. It would be premature, they say, to take any of the conclusions which can be drawn from the above tests as being final. As in all practical questions experience will have to supplement experiments before any absolutely definite results can be arrived at. But a few facts may be pointed out which seem to be clearly indicated by the results of the tests, and which, at least, show the direction in which further investigations may be fully conducted, and where practical improvements are specially required.

There is no doubt whatever that the manufacturers of steel are now able to produce a material as homogeneous and reliable as the best iron. The absence of lamination makes it in this respect even superior to iron for a structure like a boiler, in which the plates are, as a rule, exposed to strains in every direction.

But this result has been obtained by reducing the hardness of steel to a minimum, which materially reduces its increased usefulness. The tensile shearing strength of the material supplied for these tests by some of the most experienced makers of steel, and by them no doubt considered the best for the purpose, has in these experiments proved to be not more than 16 per cent. above that of the iron, and the want of hardness (as distinct from tensile strength) has proved to be a very serious disadvantage in boiler work. What the trade now requires is a return to a harder material of increased tensile strength, without losing the homogeneity which is at present obtained at the expense of hardness. It can scarcely be doubted that the increasing experience in the manufacture of steel which has already overcome so many and such serious difficulties will, in time, meet this requirement.

A number of curious facts referring to riveted joints were indicated by the trials. Steel showed in this respect a decided superiority over iron beyond the proportion due to its greater tensile and shearing strength, the average strength of all the steel seams broken being 60.2 per cent. of the solid plates, that of the iron only 54.0 per cent. This proportion was still more striking in all lap-joints, in which the greater stiffness of the material prevented the injurious bending of the plate in the line of the rivets, this being no doubt the chief cause of the great weakness of this kind of joint. The experiments further show that the plates invariably lose part of the tensile strength in the section of solid material left between the rivets of a seam, this loss being greatest in lap-joints. It also is greater in punched than in drilled plates (iron as well as steel), and greater in plates riveted together by steam than in those riveted by hydraulic pressure. On the other hand the strength of rivets against shearing is greater than its normal figure, especially in lap-joints.

The usefulness of double-riveting appears to be mainly due to the fact that it more effectively prevents lap-jointed plates from bending under stress. At the same time the zig-zag riveting generally adopted in double riveting increases the tensile resistance of the material between the rivets considerably beyond its normal figure.

Butt joints with a cover on one side of the plates gave no advantage at all, the cover behaving simply as an intermediate plate attached to the two main pieces by an ordinary lap-joint. A marked improvement could no doubt be obtained by giving to the cover greater thickness, so as to prevent its bending.

The most effective seams as to tensile strength were, of course, butt joints with two covers, as not only do they nearly double the shearing strength of each rivet, but they entirely prevent the bending of the main plates. The main fact resulting from the tests of parts of boilers and complete boilers under hydraulic pressure was the impossibility of bursting an ordinary rivet seam in this way, the compression of the rivet and elongation of the rivet-hole resulting invariably in leakage, which prevented the necessary pressure from being obtained. Each rivet became its own safety

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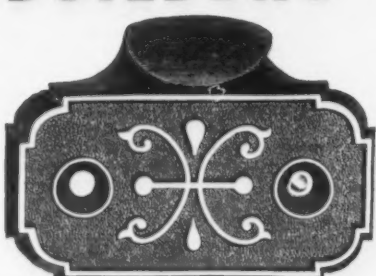


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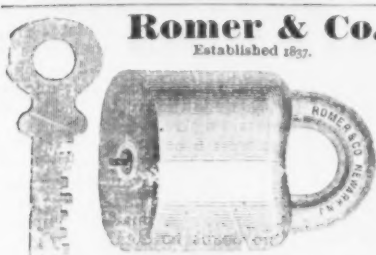
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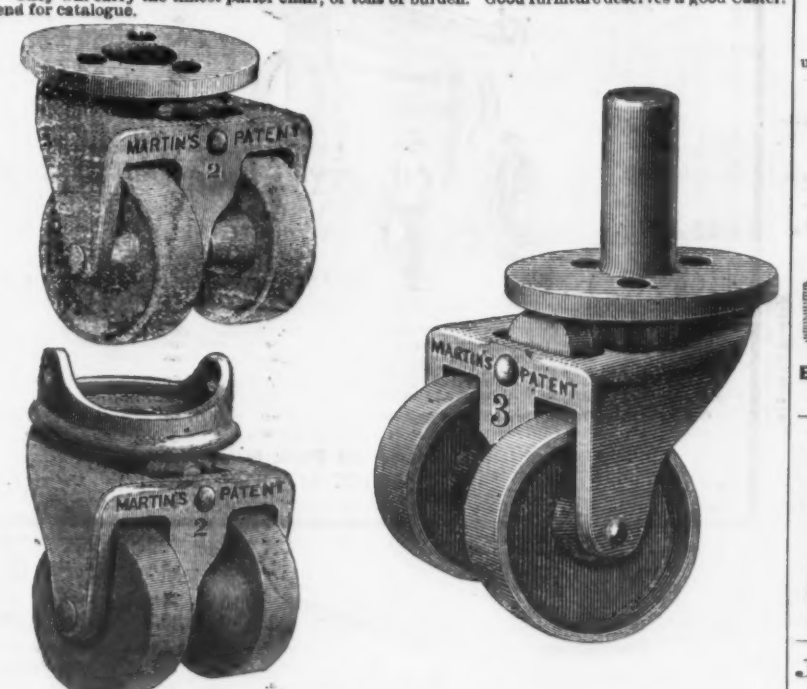
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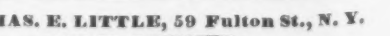
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NOTICE.

The trade is hereby cautioned against infringing the Letters Patent of the Weston Dynamo-Electric Machine Company for improvements in Dynamo-Electric Machines, by either selling or using machines embodying those improvements.

We are retained to prosecute all who infringe the Letters Patent, and shall promptly institute proceedings against all who shall be detected in infringing them in any way. Proceedings have already been commenced against the more prominent infringers.

DICKERSON & DICKERSON,
Counsel for Weston Dynamo Electric Machine Co.

WESTON DYNAMO-ELECTRIC MACHINE

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We are furnishing outfits specially adapted for Stove Work, giving a pure white deposit on plain or metal surfaces.
Outfits complete, with Dynamo-Electric Machine Tanks, Anodes, Solution, &c., &c., \$250.
We beg to refer to the following Stove Manufacturers among 200 other houses using the Weston Machine: Richardson & Boynton, S. S. Jewett & Co., Fuller, Warren & Co., Perry & Co., Detroit Stove Works, Michigan Stove Co., Co-operative Stove Co., E. & C. Gurney, Hamilton & Toronto, and many others.

INFRINGEMENTS.
We call attention to infringements of the Weston Machine, in which Automatic Scales are used to pre-empt changes of current. The Weston Co. are owners by grant or purchase of all forms of Automatic Scales for Plating Machines. The adoption of these machines will certainly lead to great loss to parties purchasing or using them.

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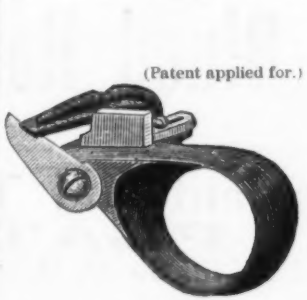
valve, and the strain put on the weakest part of the structure never reached more than 70 per cent. of the breaking strain. This is the point where additional hardness of the material would be most useful, as it would prevent the opening of the rivet holes, which now makes a boiler useless long before the breaking strain is reached.

On the question of the durability of boilers, it is probably impossible to throw much light by experiments. Here practical experience is the only reliable guide, and every well-authenticated example is of some value. The paper may therefore be concluded with the mention of one such example which presented itself for careful examination during the last few weeks. Two boilers, similar in construction to those used during these experiments, were constructed by Messrs. John Fowler & Co. in the spring of 1868, one being entirely of steel, the other of iron. They were used for the two engines of a steam-ploughing tackle, and have just returned for repairs to the manufacturers after eleven years of work, during which they had been provided with new fire-boxes in 1874.

During the whole time these boilers had to go through the severest work and treatment to which boilers can be exposed, using every variety of the worst water, traveling over the roughest roads, and being exposed to every sort of weather without external protection. Both boilers, also, had to do exactly the same amount of work and to undergo the same hardships, as neither of the two engines can work without the other. The result is most striking. The steel boiler has never given any trouble, and is now by far the best of the two. A few cases of this description should finally settle the question as to the superiority of steel in this respect.

Lace Leather Cutter.

The value of an efficient tool to cut lace leather will be appreciated by all who have had occasion to witness the waste in straight-



LACE LEATHER CUTTER.

ening lace leather cut with a pocket-knife. In the accompanying engraving, we show a tool recently devised and introduced by Messrs. Jackson & Tyler, of Baltimore, Md. As will be seen, it has an adjustable attachment for maintaining the proper width of the lace cut. It is used in the following manner: Place the cutter on the second finger of the right hand and let the first finger rest under the cutter, with the thumb pressing on the top.

How to Find the Bearing Strength of Timber.

Prof. Carpenter, of the Michigan Agricultural College, furnishes the following rules for finding the weights that timber of a given size, supported at both ends, will sustain:

FIRST.—If a weight be uniformly distributed from end to end of a horizontal beam, it produces the same effect on a beam as though one-half the weight were gathered at the center of the beam.

Example.—A horizontal beam, 16 feet in length, sustains a floor 2 feet each side of it. If the weight of floor and load that may be expected to get on it be taken as 75 pounds per square foot, we should find the total load sustained by the beam to be its length, multiplied by the number of square feet sustained, multiplied by the load on each square foot, or $16 \times 4 \times 75 = 4800$ pounds. This would be equivalent to a center load of 2400 pounds.

SECOND.—(Converse of first.) If a beam sustain a certain load at the center, it will sustain twice as much load provided it be uniformly distributed.

THIRD.—The safe load should not exceed one-fourth or one-fifth the breaking load in bridges, or in floors subject to much vibration from moving bodies. In roofs the safe load should not exceed one-fourth or one-third the breaking load. (These precautions are necessary for two reasons—timber is injured by a load much below the breaking load, and imperfections in workmanship and material are constantly occurring.)

FOURTH.—(The safe load is assumed to be one-fifth the breaking.) To find the safe load that a horizontal pine beam, supported at both ends, will sustain:

Rule.—Multiply the breadth of a beam by the square of its depth, and that product by the number 90; divide this result by the length of the beam between the supports, and the quotient will be the number of pounds in the load that the beam will safely carry at the center. If the load is uniformly distributed it will be twice the safe center load, and the foregoing result may be doubled to obtain the total distributed load. (See rule first and second.) If any material besides pine is used, instead of the number 90 the numbers in the following table must be used:

White oak.....	120
Red or black oak.....	110
White ash.....	130
Swamp ash.....	80
Black ash.....	60
White beech.....	90
White cedar or Arbor Vitae.....	50
Walnut.....	90
Tamarack.....	80
Spruce.....	110
Maple.....	120
Hickory.....	140
Rock elm.....	70
Locust.....	120
White pine.....	90

Example.—What will be the center safe load of a pine beam, 4 x 6 inches, supported

in two places, and 12 feet long between the supports?

1. If the depth be 6 inches and the breadth 4 inches, the center load = $4 \times 36 \times 90$ divided by 12 = 1080 pounds.

2. If the depth be 4 inches and the breadth be 6 inches, the center load is $6 \times 16 \times 90$ divided by 12 = 720 pounds. From these examples it is seen to be always most economical to set a horizontal beam on its edge, or place it so that the greatest dimension shall correspond to its depth.

FIFTH.—To find the weight that an inclined beam (as a rafter) will safely bear at the center distance between supports:

Rule.—Find the center weight that a beam of length equal to the horizontal span or spread of the inclined beam will safely sustain, by the fourth rule; divide this result by the horizontal span of the inclined beam and multiply it by the length of the inclined beam.

Example.—What will a pine rafter 20 feet long, with 12 feet rise and horizontal span of 16 feet, if 2 x 4 inches, sustain safely at center when there is supposed to be no support at its center? If horizontal and 16 feet long, the safe center weight = $2 \times 16 \times 90$ divided by 16, or 180 pounds, dividing this result by 16 and multiplying by 20, the safe center weight is 220 pounds. This would correspond to a uniformly distributed load of 440 pounds. If this rafter be supposed to carry two square feet for each foot in length, the load would be 104 pounds to each square foot.

Note.—A rafter of these dimensions would need a support at the center; in that case its horizontal span would be 8 feet instead of 16. The result would be a safe center load of 440 pounds or a safe distributed load of 880 pounds—but this is distributed over a rafter 10 feet long instead of 20, so that on the same supposition as before the safe load becomes 41.6 pounds per square foot—a safe load for any roof.

Remarks.—This rule, although sufficiently exact for ordinary purposes, and safe for ordinary roofs when the factor of safety,

five, is used, must be replaced by more exact and complicated rules when very exact results are required. This is safe for all farm buildings.

SIXTH.—When the dimensions of a horizontal beam that will safely carry a given load is wanted, the following rule must be used:

The product of the breadth into the square of the depth equals the load at the center divided by 90 for pine, or by the numbers given under the fourth rule for any other material. By assuming the depth the breadth can be found.

Example.—What sized pine beam, 16 feet long, will safely support 1000 pounds at its center? One thousand divided by 90 equals 11.1, equals the breadth multiplied by the square of the depth. If we assume the depth to be 3 inches, its square is 9 and the breadth 11.1, divided by 9 = 1.3.

Hence the answer is a piece 1.3 x 3.

When the load is distributed over a number of square feet, the center load must first be found by multiplying by the number of feet and dividing by 2.

SEVENTH.—If the beam is inclined, divide the center load by the length of the beam. Multiply this quotient by the horizontal space, and proceed as in the sixth.

EIGHTH.—The amount an upright beam will safely carry when subjected to a pulling strain, can be found by multiplying the number of square inches of its cross section by the strength of 1 square inch.

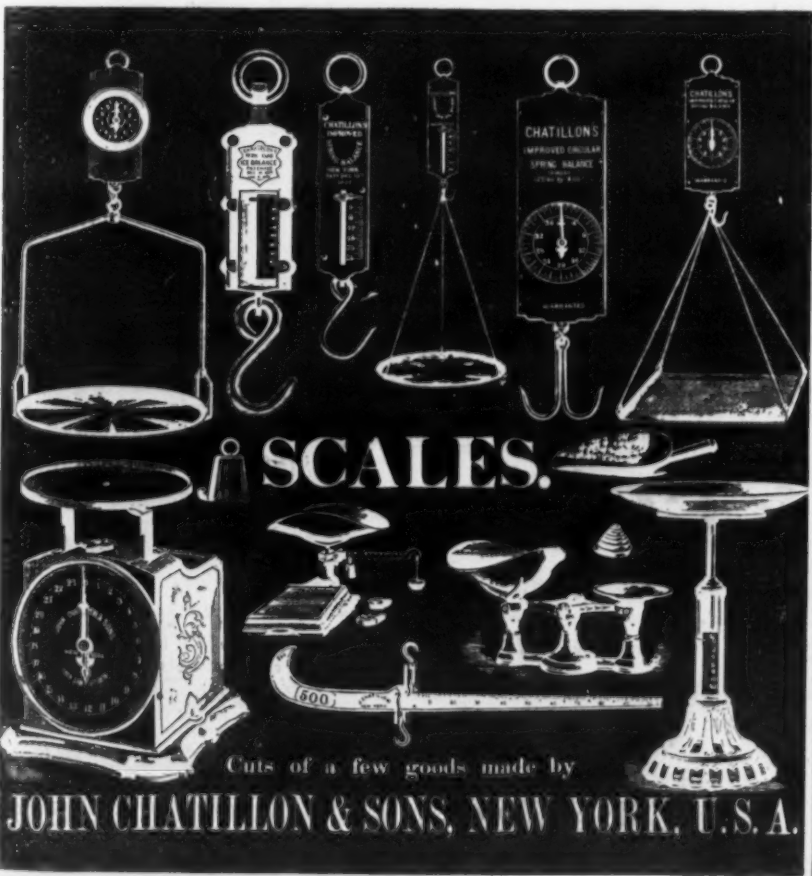
The following table gives the safe strength of different woods in pounds per square inch:

Ash.....	3200
Elm.....	1200
Hickory.....	2200
Maple.....	3000
White oak.....	2200
Pine.....	2000
Walnut.....	1000
Poplar.....	1400

NINTH.—The amount an upright post loaded at upper end will sustain can be found approximately in the same way as the tensile load; the amount per square inch should be taken about four-fifths that given in rule eight. This is an approximate rule that cannot be relied on in cases where very accurate results are required.

These rules give accurate results, with the exception of rules fifth and ninth. The results given by rule fifth are safe and do not differ much from the true results. Those given by rule ninth, for the size of posts, are very nearly correct when the posts are of moderate length.

Diverting the Oxus River from its Present Course.—One of the numerous engineering problems which it has been left to this generation to solve is the turning back, by Russian Engineers, of the Oxus into its Caspian Sea channel, from which it was diverted into Lake Aral by Oetai Khan, when besieging Khiva in 1235. Immediately after the Khiva expedition of 1873, a scientific survey was made of the Lower Oxus, and most of the experts were of opinion that the progressive diminution of the river by artificial irrigation, and the evaporation consequent upon the destruction of the forests which shielded it from the sun, had made its volume insufficient to traverse an extra distance of nearly 5000 miles incumbered with deep sand. It is now stated, however, that the experiment is actually being made; and the Lower Syr-Daria being only 12 inches deep in summer, the Russians may well do their utmost for the Oxus, as their only possible waterway into the heart of Central Asia.



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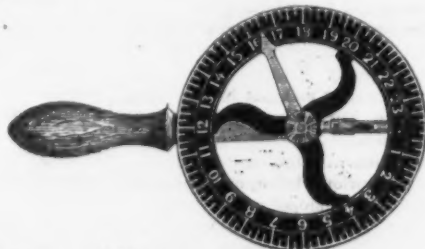


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in purchasing one or both of above
tools for holding Tire or other Bolts
from turning while removing or
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WITH LYON'S Improved Tire Gauge

There is no necessity of springing a spoke. It consists of a wheel
24 inches in circumference, marked off into inches and fractional
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mer Handles. Also
COTTON AND DALE HOOKS,
Patented Feb. 13, 1877; a new combination of Hooks.
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LABOR AND WAGES.

The coal miners of Western Pennsylvania held a convention last week at Pittsburgh. Representatives were present from nearly all the pits in the district, both railroad and river. The only action taken was the appointment of a committee, consisting of four river and four railroad miners and one at large, to make arrangements with the coal operators for a conference on the subject of wages. The purpose of the conference, as declared by the officers of the convention, is to adopt a scale of prices whereby strikes may be avoided.

The strike in the Mahanoy district appears to be extending, and although no new features have been developed at that place, all is quiet and many of the men have returned to work at the advance of five cents per wagon offered by the operators. Those of the miners who have not yet accepted those terms will in all probability do so in a day or two. The strike has extended to the Lehigh district, and the miners at Ebervale, Harleigh, Beaver Brook and Audenried struck yesterday morning for an advance of 20 per cent. The Jeansville men gave notice that they would cease last night unless their demand for an increase was complied with. Under the basis of 1875, by which the Lehigh miners and laborers are now paid, when coal sells at \$3 per ton at tide, the miners will receive 30.06 cents per ton for cutting coal, miners' wages per week, \$9.07; inside laborers from \$7.75 to \$7.13 per week; outside laborers from \$6.60 to \$6 per week.—*Pittsburgh (Pa.) Miners' Journal*, July 11.

The following circular has just been issued by the Schuylkill Coal Exchange:

POTTSVILLE, PA., July 9, 1879.

The following collieries drawn to furnish prices of coal sold in June, to fix rate of wages to be paid for that month, make the following returns:

Schuylkill Colliery (P. & R. C. & I. Co.).....\$1.68
Mine Hill (Cap Colliery).....1.65
Girard Colliery.....1.65
Kohinoor Colliery (R. Heckscher & Co.).....1.73
Continental Colliery (sold to Lehigh Valley Co.).....No returns

The average of these prices being \$1.68, the rate of wages to be paid for June, 1879, is 27 per cent. below the \$2.50 basis. Notwithstanding the above rate of wages will be 16 per cent. below basis, in accordance with the arrangement made by the Philadelphia and Reading Company with its men.

The Allentown, Pa., *Chronicle and News* of July 11th, says: There is great discontent among the miners in the Hazleton district, and this morning strikes were inaugurated at Jeansville, Buck Mountain, Eckley, Jeddo and other places. The strike is expected to become general. The miners demand an advance in wages of 15 per cent. for every dollar advance in the price of coal.

A meeting of representatives of the collieries in the Lehigh region unanimously adopted the following resolutions: "Resolved, That we demand 40 cents per ton when coal sells at Elizabethport and Port Johnson at \$3 per ton; miners' wages, company work, \$11 per week; inside laborers, \$9 week; outside, first class hands, \$7; second class, \$6; and for every dollar that coal advances we demand 5 cents per ton advance, and for outside and inside, and all those that work by the day, we demand 15 per cent. for every dollar coal advances in market, or the fractional part thereof. That when coal comes under \$3 we cease work. That if the demand is not conceded to us we cease work on the 10th inst."

The chimney glass works of Messrs Chalmers, Hogan & Co., and Messrs. Evans & Co., on the South Side, Pittsburgh, resumed operations on Monday, the 7th inst. The old gatherers will not be employed unless they accept the manufacturers' proposition. They are not supported by the blowers in their present movement. The troubles between the pressed glassware makers and their employers, too, are settled, and work will be resumed at McKee's works. The old hands will work side by side with the men who took the places of a few of them as green hands. There is to be no reduction in wages, and the strikers even claim that there will be an increase. The manufacturers say they have no objections to the strikers claiming a victory in the case. All they wanted was the opportunity to run their works as they pleased without the dictation of the union, and this they propose to do.

There has been some trouble at the foundry of A. Garrison & Co., Pittsburgh, some 10 or 15 men having been discharged. Owing to a rush of orders, the men had agreed to work three and a half hours each day overtime, for which they were to be allowed one-half day's wages. They were tardy, and the firm lost from 15 to 30 minutes to each man in frequent cases. The question of wages never entered into the subject, but the men were given the alternative to work full time or withdraw from the establishment. They accepted the latter. Their places are now filled by other skilled mechanics.

MINING AND MINERAL ITEMS.

COAL.

The failure of the usual June rise of the Ohio River has left the lower Ohio almost bare of Pittsburgh coal, and the manufacturers of the cities along the river are trying other coals which they have hitherto discarded.

A correspondent from New Albany, Indiana, says: The De Pauw American Plate Glass Works of this city, having tested the efficacy of Davies County (Ind.) coal in the furnace, has contracted for 10 car loads per day during the continuance of low water in the Ohio, and the exhaustion of the supply of Pittsburgh coal, and will resume operations on Monday next. Most of the other large factories in the city have contracted for Indiana coal sufficient to bridge over the famine in the Pittsburgh article.

Several coal companies of large means are procuring the necessary outfit and opening mines in the neighborhood of Ferrara, Perry County, Ohio, preparatory to shipping coal in large quantities as soon as the Columbus and Sandy Creek Valley Railroad is finished

to Ferrara, which is to be the present terminus of the road. The "Great Seam" is from 12 to 13 feet thick in this locality, and the "Stallsmith" and "Norris" seams from 4 to 5 feet each in thickness, and situated, geologically speaking, above the great seam.—*Pittsburgh Telegraph*.

The Centerville (Iowa) Coal and Mining Company reach coal in their new shaft at a depth of 105 feet.

The total product of the Schuylkill region until July 5, foots up 12,172,244 tons, which is an increase of 5,142,236 tons over the same period of last year, and 2,361,893 tons over the year 1877.

IRON.

The celebrated Tilly Foster Iron Mine has been purchased by parties in the interest of the Lackawanna Coal and Iron Company, of Scranton, Pa.

Two English steamers have just discharged over 3500 tons of Spanish iron ore from Gijon at Hoboken. They receive \$2.50 freight per ton, which is thought better than receiving no freight at all on ballast, and paying to discharge it when here.

A new vein of iron ore has been opened and worked during the past few months at the Podunk Mine, in Fort Ann, N. Y., which has already assumed large proportions.

LEAD.

The production of Joplin lead is decreasing. According to some statements, if new mines are not soon discovered, the town will be but a thing of the past.

PRECIOUS METALS.

The San Francisco *Bulletin* condenses the history of Mono County and its mines: The first bar of bullion from the Standard mine in Mono County was shipped in April, 1877, and from that time down to June 25, 1879, the mine produced and shipped \$2,366,771, of which \$1,300,000 was paid over to stockholders in dividends. It is said there is enough ore in sight to keep the mill in operation for two years more. The first bar from the Brodie mine was shipped in July 1878, and from that time down to June 25, 1879, the mine has produced \$1,242,712, and paid \$800,000 in dividends to stockholders. This mine recently renewed its lease of bullion-bearing rock, and bids fair to yield handsomely for some time. It is said that Mono County has given \$4,000,000 to the world since the renewal of operations at that camp in April, 1878. Many predict a prosperous mining future for the county.

Consolidated Virginia has just paid its forty-ninth dividend, making \$49,850,000 from the beginning. California has just paid its thirty-second, swelling its total to \$80,780,000, and Eureka Consolidated has just declared its forty-fourth one, footing up from the first \$3,850,000.

The San Antonio *Express* recently published a very concise and exhaustive description of the mineral lands of West Texas. A mountainous section taking in the entire county of Llano and portions of Burnett, Blanco, Gillespie, Mason and San Saba counties, is described as very rich, immense beds of quartz cropping out, which have in some instances been traced for miles. In the Cape Brown silver mine ore was produced whose product would be \$2000 to the ton. The Lawrence Miller Mine has also yielded fine ore, and an Eastern company has made overtures for its purchase, agreeing to put in \$300,000 worth of machinery. An assay of Galena ore from the McGeehe mine gave result of from \$320 to \$580 per ton.

Twenty million dollars is the small amount for which the Little Pittsburgh, of Leadville, has been stocked.

How to Grind Edge Tools.

A writer in *Carpentry and Building* says: Edge tools are fitted up by grinding. The sharp grit of the grindstone, being harder than the iron or steel, cuts very small channels in the surface of the metal, and the revolving disk carries away all the minute particles that are detached by the grit. If we were to examine the surface of the tool that has just been removed from the grindstone under the lens of a powerful microscope, it would appear, as it were, like the rough surface of a field which has recently been scarified with some implement that had formed alternate ridges and furrows. Hence, as these ridges and furrows run together from both sides at the cutting edge, the newly ground edge seems to be formed of a system of minute teeth, rather than to consist of a smooth edge. For this reason a tool is first ground on a coarse stone, so as to wear the surface of the steel away rapidly; then it is polished on a wheel of much finer grit; and, finally, in order to reduce the serrature as much as possible, a whetstone of the finest grit must be employed. This gives a cutting edge having the smallest possible serrature. A razor, for example, does not have a perfect cutting edge, as one may perceive by viewing it through a microscope. Beginners are sometimes instructed, when grinding edge tools, to have the stone revolve toward the cutting edge, and sometimes from it. When the first grinding is being done it is a matter of indifference whether this is done or not; but when the finishing touches are applied near and at the very edge, a grinder can always complete his task with more accuracy if the periphery of the grindstone revolves toward the cutting edge, as the steel that is worn away will be removed more easily; whereas, when a stone runs in the opposite direction, the grinder cannot always tell exactly when the side of the tool is fully ground up to the edge. This is more especially true when the steel has a rather low or soft temper. The stone, when running from the edge, will not sweep away every particle of the metal that hangs as a "feather," but when the stone revolves toward the edge, there will be no "feather edge" to deceive the eye of the grinder.

The Birmingham correspondent of the *Times* says that the only comforting incident in connection with the iron trade at the present time, is that the Tipton Drainage Commissioners have now raised nearly £21,000 (\$101,640), which is more than half of what is required to rescue the mines in the district from threatened inundation.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, July 17, 1879.

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Hardware and Metal Prices.

Last week witnessed a most peculiar labor
outbreak in the city of Pittsburgh, which is
becoming somewhat notorious in labor an-
nals. For some time past there has been a
strike in the coal mines of the Birmingham
Coal Company, Limited, whose mines are
situated in a suburb of Pittsburgh. It arose
from a refusal of the company to curtail
production in accordance with the peculiar
theories of the miners. Some of the miners
were willing to make full time, and permis-
sion was given them. A strike resulted,
and as the offenders kept on working, a
meeting of the striking miners was called.
Having some fear of the law, the brave
strikers concluded it would not be wise to
lead a forlorn hope against the miners, so
they courageously sent their women to ac-
complish by physical force what they could
not by moral suasion, and an amazonian
crowd with clubs and filth and stones at-
tacked a pit boss who had been teaching
black-legs how to mine coal, chased him into
an empty house and held him in "hook"

until his pistol drove them away. Criminal
suits have been entered against the women,
who are mostly Germans.

American Trade and the New German Tariff.

The new German tariff imposes duties on
several American products hitherto ex-
empted, and is therefore important to us
in more than one respect. With the assistance
of late telegrams sent to the Associated
Press, we shall endeavor to present this
tariff, in its main features, as it was finally
adopted July 12. Before doing so, how-
ever, it will be instructive to cast a glance
at the motives which led Prince Bismarck to
propose the new system, and to carry it into
execution in such an expeditious manner.

Ever since the attempts at assassination
made upon the Emperor William last sum-
mer, Prince Bismarck has deemed it impera-
tive to obtain a still greater control of the
management of the Empire through central-
ization. The so-called "matricular" contri-
butions hitherto made by Confederate States,
toward defraying the expenses of the Empire,
he proposes to do away with by an increase of
imperial revenue from customs, and at the
same time he affords protection to certain ag-
ricultural, pastoral and industrial interests by
thus raising certain duties. The tariff has
thus become a revenue tariff on the one hand,
and moderately protective on the other.

On December 15, 1878, Bismarck embod-
ied his views in a letter, which took most
people by surprise. January 3, 1879, his
project was submitted to a special commit-
tee; April 2, the Federal council adopted
the report of the latter, with a few trifling
modifications. It was then handed over
for debate to parliament, where the measure
passed after a discussion extending over
some six weeks. Prince Bismarck and his
proposed tariff modifications were violently
attacked by the opposition, but the measure
was finally carried, with some changes which
we shall point out. Bismarck personally
defended his measure, and made important
concessions in a party sense in order to
fortify his position, his well-known diplo-
matic cleverness enabling him to defeat his
antagonists by marshalling forces against
them even from the clerical ranks.

The project as it was submitted to parlia-
ment, stood as follows:

To remain duty free: Coal, coke, fire-
wood, charcoal, stone, lead, copper, spelter,
tin in ingots, slabs, pigs and in the ore;
cylinders, silk, wool, flax and raw cotton,
hides, skins and undressed furs, paper pulp,
rags, books, India rubber, tar, gunpowder,
sediment from wine, mineral water, man-
ures, refuse from hides, metals, &c., colts
and goats.

Goods heretofore free to be made dutiable
as follows (per 100 kilos, except where other-
wise indicated): Wheat, 25 cents of our
money; oats, 25 cents; barley, Indian corn
and buckwheat, 12 cents; paddy, 12 cents;
flour, 50 cents; malt, 30 cents; steers, per
head, \$1.50; oxen, \$5; cows, \$1.50; young
bulls and cows, \$1; calves, 50 cents; sheep,
25 cents; fresh meat, per 100 kilos, \$3;
poultry and game, \$3; greases, \$2.50; palm
and cocoa nut oil, 50 cents; petroleum,
\$1.50; pig iron, 25 cents; bar iron and rails,
65 cents; thick iron wire, 65 cents; thin
ditto, 75 cents; sheet lead, 75 cents; type,
75 cents; sheet zinc, 75 cents; rolled tin,
75 cents; empty bottles, 75 cents; wrap-
ping paper, \$1; straw mats, 75 cents; cot-
ton wadding, 37 cents; dressed silk, not
dyed, \$3; combed wools, 50 cents, and lum-
ber, 2½ cents.

Articles which are to remain as heretofore,
with the duty they have been paying set
against them: Sugar, per 100 kilos, \$7.50;
cocoa and cocoa shells, \$8.75; oranges and
lemons, \$3; cutlery, \$6; sewing needles,
\$15; steel pens, \$15; manufactures of cop-
per, tin and lead, \$6; fine brushes, \$6, and
common woolen yarn, 75 cents.

The following are articles on which the
duty has been raised, with the old and new
rates set against them:

	New rate. 100 kilos.	Old rate. 100 kilos.
Wine and cider, in casks.....	\$6.00	\$4.00
" " in bottles.....	12.00	4.00
Brandy and rum.....	15.00	9.00
Beer.....	1.50	1.00
Hops.....	5.00	2.50
Coffee, green.....	10.50	8.75
" roasted.....	12.50	10.50
Tea.....	25.00	12.00
Salt.....	3.20	3.00
Pepper.....	12.50	9.75
Butter.....	5.00	2.00
Cheese.....	5.00	2.50
Raisins and figs.....	7.50	6.00
Honey.....	0.75	0.50
Oil for table use, in casks.....	2.00	1.25
" " in bottles.....	5.00	1.25
Candles.....	3.75	2.25

Aside from these modifications, the Ger-
man spinning interest has been more
powerfully protected, but we abstain from
going into the somewhat complicated de-
tails, the more so as they have no practical
interest for Americans. France, England,
Belgium, Austria and Switzerland, however,
are directly affected by these important
changes.

According to mail advices to the middle
of June, and telegrams to the 12th instant,
when the bill was passed, the following im-
portant resolutions have passed a third and
last reading: Tobacco to pay an import
duty of \$21.25 the 100 kilos; crude feathers
to be duty free; coffee to pay \$10 (instead
of \$10.50, proposed), and petroleum to pay
the \$1.50 per 100 kilos proposed.

During the debates a small tax was pro-
posed to be levied on the importation of raw
cotton, and according to the Associated
Press telegram of July 11, it was adopted.
We shall have to wait for details by mail as

regards this item. An additional duty of 50
per cent. is to be levied on the productions
of countries treating German products with
exceptional rigor—a retaliatory measure
which the government had proposed to make
an extra duty of 100 per cent.

So far as American interests are con-
cerned, the new tariff, as we have given it,
affects the following products: Breadstuffs,
live animals and fresh meat, the various
greases (such as lard, &c.) and petroleum.
Iron and the other metals in a manu-
factured state we did not ship to Germany,
nor should we have shipped them anyway;
hence the duty does not affect us. Cutlery,
we perceive, remains as it was, and we pre-
sume this is true with respect to hardware
and tools. The duty on petroleum, it is ex-
pected, will produce \$5,000,000 revenue; but
this article is of a prime cost so low that they
can produce nothing in Germany to suc-
cessfully compete with it, refined rapeseed
oil being dearer and giving a poor
light. The same is true of breadstuffs. A
duty of 50 cents per barrel on flour is very
moderate, and our flour of the better kind is
so superior that the Germans will be glad to
pay the difference. We may say as much
of the cereals. We are producing wheat
and corn so cheap and our crop is so abun-
dant, that, with reasonable freight rates to
the seaboard and moderate ones across the
Atlantic, the duty of 7 cents per bushel on
wheat and 3½ cents on corn, will not pre-
vent our people from underselling the Ger-
man farmer, with wheat at least, in his own
market. Prime refined lard is so cheap in
America (6½ cents), that the 1½ cents duty
will not exclude it. As for live animals for
slaughtering and fresh meat, the Germans
would probably never import them from
the United States, even if duty free, for
they are themselves exporters to England.
The English and French markets will suf-
fice all our purposes in pushing this new
export branch. Our cotton the Germans
cannot do without, and any trifling duty
thereon will not make the slightest differ-
ence so far as our export to Germany is
concerned.

The duty on tobacco, it is true, falls
heavily on our product, and is about the
only one likely to do some mischief, although
we believe that the Germans are absolutely
compelled to buy our seed-leaf tobacco, for
they have none of German growth that we
know of that might be used as a substitute
for it for cigar wrappers, in imitation of
Havana; nor do we believe that for smok-
ing tobacco mixtures and for chewing they
can dispense with Virginia and Kentucky.
Taking a general view of the new tariff, we
feel convinced that it will do little, if any,
harm to our growing business relations with
Germany.

Gold and Silver Mining Investments.

The refunding of the national debt, and
the reluctance with which money is invested
in manufacturing enterprises, owing to the
numerous failures during the last few years,
has thrown upon the money market large
amounts of funds, for which opportunities
of more remunerative employment than are
now offered are eagerly sought. Attention
has been justly directed to the min-
eral wealth of many sections of the coun-
try, and more especially to that of the
Rocky Mountains. The mines of the Com-
stock lode, with its far-famed bonanzas
and its less notorious, but more oppressive,
assessments, have monopolized the attention
of the general public, and succeeded in con-
vincing thoughtful men that the mining of
the precious metals is a lottery so conducted
as to afford its managers the benefit of enor-
mous odds. Little was known or thought of
the innumerable small mining enterprises of
the West which, controlled by a limited num-
ber of capitalists, were quietly conducted on
sound business principles. The readiness
with which large numbers of small investors
have fallen, and still fall, victims to tricky
stock manipulations like those which have
disgraced the management of some of the
Comstock mines, proves that the character
of the business of gold and silver mining is
entirely misunderstood by the general public.
Instead of being a game of chance, in which
a lucky venture may be rewarded with extra-
ordinary returns, the extraction of the pre-
cious metals is a pursuit which calls for as
much prudence, energy and enterprise as
any other legitimate business; and while in
some cases the profits may be exceptionally
large, they should not be expected, as a rule,
to go beyond the figures which are conceded
to be satisfactory in other branches of in-
dustry.

This is too easily forgotten when a fever
of speculation seizes rich and poor. Securi-
ties are purchased whose intrinsic value is
far below the valuation which they have
reached, upon the basis of fabulous reports
and cleverly distributed dividends. They in-
duce a gambling mania. Only a few buy
for the sake of permanent investment, the
great majority purchasing with the object of
holding for a rise or making a "quick turn."
The bubble finally collapses, and the bona
fide investors are left to mourn over the
losses which their credulity has brought
them. The collapse of so many mining en-
terprises in the past has been due to man-
ifold causes, among which the foremost
have been extravagant management, igno-
rance of the methods of metallurgical treat-
ment or rash attempts to introduce un-
tried processes, change in the character
of the ore, excessive freight for sup-
plies of product, costly litigation, &c. All

these, singly or together, have contributed
to wreck good mines, while quite as often the
public have been imposed upon by "wild-cat"
enterprises, floated and engineered in stock
markets by swindlers. The first step which
an intending investor ought to take is to as-
sure himself of the actual present value of
the mine, and of the validity of the title held
by those who offer a part or the whole for
sale. The audacity with which the value of
a mineral deposit is misrepresented, and the
confidence with which crude theories as to
its future prospects are advanced, are mar-
velous. The history of the development of
mining in this country is full of painful in-
cidents of this nature. We are far from as-
serting that they were in all cases premed-
itated swindles, as at times the enthusiasm
and ignorance of promoters of mining
schemes were so blended as to add the dan-
gerous element of sincere conviction on their
part to the allurements of their representa-
tions. Foreign investors, notably the Eng-
lish and Dutch, have so severely suffered
from injudicious ventures in Western mines,
that little assistance can be hoped for at
their hands for the development of our min-
eral resources. Indeed, it would seem that
what little confidence is left abroad will be
destroyed by enterprises which are now be-
ing placed on the market, or have just been
floated. These indications may suffice to
prove that an investment in a gold or silver
mine, instead of being a simple guess at the
best chances gleaned from a week's study of
the mining stock quotations, is a matter
which demands exceptional prudence and
forethought. If these are exercised, we know
of few better opportunities to profitably em-
ploy capital than the purchase of an interest
in a well-managed mine.

There is one point to which we would di-
rect the attention of would-be investors—the
necessity of gaining a clear insight into
the nature of the deposit before accepting
the statements made as to its prospective
value. There are at the disposal of the
mining engineer three distinct means of as-
certaining the value of a mine, or at least a
near approximation. The first is the valua-
tion of the ore actually in sight; that is,
the bodies of ore which the workings of the
mine have laid bare. The more regular and
uniform the occurrence of the ore bodies in
the deposit, the closer will be the approxi-
mation. While the estimation of the ore in
sight is the best basis for the valuation of a
mine, it is manifestly unfair to expect the
surrender of property rights on unopened
ground without some equivalent. This is the
factor which is generally overestimated,
and which is usually made the pretense of
an exorbitant valuation. As an instance
of this kind we may cite the little Pittsburgh
Mining Co., of Leadville, Col., which has
been stocked on the basis of twenty millions
of dollars. From a report on the property
by Dr. Raymond, an experienced and con-
scientious engineer and geologist, we learn
that one-third of the area of the property,
the explored portion, will probably yield
three millions worth of ore. Granting that
the remaining two-thirds are as rich, which
they may or may not be, we read the figure
of nine millions as a fair estimate of gross
returns. Eleven millions of dollars are,
therefore, the price which is to be paid for
possible chances and for the contested,
though promising, right of the company to
work those portions of the vein on the dip
which lie beyond the vertical boundary lines
of their group of claims. This is exorbitant,
even if the dividends which the company
may be able to pay for some years are
equivalent to a large rate of interest on so
indicated a capital. A second basis is the
amount and value of the ore already ex-
tracted, which may serve as a good guide
to determine whether or not regular and
continuous working, with improved facili-
ties, can prove remunerative. A third
point which deserves closer scrutiny at
the hands of investors is the nature of the
deposit itself. Metalliferous deposits may
be divided into two classes. The
one embraces all those which are termed
"true fissure veins." They are fissures
in the earth's crust, formed and filled
at a period subsequent to the formation of
the surrounding rocks. Fissure veins fre-
quently vary but little in thickness, though
they are rarely uniformly filled with ore or
minerals. Their chief point of interest
is that they always extend downward with-
out giving out. Such, at least, has been the
general experience of miners in all countries.
With fissure veins the continuance of the
deposit downward may be relied upon.
This is not so with the other class of deposits
which, being of different origin, obey other
laws as to their continuance. With such de-
posits a second source of uncertainty is
added to that of an irregular distribution of
the valuable mineral within the confines of
the deposit: there is no telling how long the
deposit itself will continue. This is a cir-
cumstance which should be thoroughly un-
derstood.

An instance of recent date, in which dis-
tinction between a regular fissure vein and
deposits which in their nature are of uncer-
tain duration, is that of the silver lead veins
of Leadville, Colorado. Geological exami-
nation has left no doubt that the so-called
Leadville "veins" are not fissure veins, but
an interstratified deposit, whose forma-
tion is antedated by the limestone upon
which it rests, and is in turn older than the
porphyry which overlies it. There is every
reason to believe that the various beds struck
at different levels are really nothing but
different portions of the same deposit, dis-

connected by a series of upheavals. Present
developments have yielded abundant indica-
tions pointing to the probable discontinuance
of the majority of the veins as greater
depth is reached. So far as prospecting
and actual extraction have gone,
there is great irregularity both in the thick-
ness of the deposit and in the value of its
contents. In fact, there can be now no
doubt that while large and rich deposits
have been struck in a few locations, the
prospects of the greater number are in-
different, while many of the claims are in-
worthless.

From what has already been said, it is
evident that the mines of Leadville belong
to the class requiring most cautious inves-
tigation on the part of investors. If our
estimate of the character of the deposit at
that point is correct, there is no difficulty in
understanding why prudent men, acquainted
with the country and experienced in gold
and silver mining, are eager to unload
Leadville stocks; and why most of them
who buy and hold them do so expecting to
make enough during the life of the mines to
return their investments with interest.
With the general public, however, the case
is quite different. Judging from the indica-
tions, the stock of the Leadville mines will
be worth most for stock jobbing purposes
up to the time the last shovelful of ore is
thrown out, and then they will fall from the
highest valuation they are likely to attain to
zero. For this reason, stock which may be
valuable as representing a mass of rich ore,
easily worked but definitely limited as to
quantity, may be utterly unsafe for pur-
poses of investment. In the case of Lead-
ville, the ore seems to be like any other
merchandise. It has value without doubt,
and may be profitably worked, but we doubt
if any shrewd operator would be willing to
purchase a claim now for any more than the
market value of the ore in sight. It is,
therefore, desirable for outsiders to ex-
hibit extreme caution in purchasing their
stocks, if it is desired to hold them as in-
vestments.

There are indications which warrant the
belief that the interest now felt in gold and
silver mining by small speculators, will de-
velop into a speculative excitement. If so,
we may expect to see the market flooded
with the stocks of wild-cat companies, and
while many deserving and promising enter-
prises are likely to be overlooked, shrewd
and unprincipled operatives will have little
trouble in entrapping the unwary small
capitalists, of whom we may expect that
thousands will be ruined by the collapse
which, under such circumstances, will be in-
evitable. This will be the more to be regret-
ted as it will discourage investments in legiti-
mate mining enterprises, and induce cap-
italists to neglect the many promising open-
ings for investment offered in the mining
districts. We have no wish to be understood
as discouraging investments at Leadville, if
the nature of the ore deposits is understood
and the fact is realized that their exhaustion
is only a question of time. Our object is only
to counsel in mining investments the same
prudence which capitalists display in the
ordinary transactions of life. If those with
money to invest will buy mining stocks with
as much judgment as they would display in
buying a horse or a house, the danger which
now menaces legitimate mining will be
averted. No man would buy a house from
a description in a real estate agent's circular,
nor a horse unproved on the representations
of an interested jockey. But men and
women will buy large blocks of shares on
the strength of prospectuses issued by the
promoters of wild-cat mining operations, or
on the representations of men at once ig-
norant of mining and interested in making
large commissions. Such hap hazard ven-
tures always were and always will be dan-
gerous, and in the present crisis of our min-
ing industries, every man who has useful
information which will protect the unwary
from the wiles of swindlers should give it to
the public. Nothing that is honest and legiti-
mate in mining will suffer from the truth.

An Organization of Charcoal Iron Makers, and What it Suggests.

Elsewhere in this issue we publish a re-
port of a meeting of the charcoal iron man-
ufacturers at Philadelphia, with a view to
arranging the preliminaries for the organiza-
tion of an association. We sympathize with
the objects of this movement, so far as we un-
derstand them, and believe it will result in
permanent benefit to this important branch
of the iron trade if wisely managed. There
is certainly room for improvement in our
methods of making charcoal iron, and es-
pecially in our methods of making and using
charcoal. The valuable foreign literature
of forestry has hitherto attracted but little
attention in this country, and it is important
that we should begin at once to conserve
our timber—at least to the extent of avoid-
ing useless waste. It is also necessary that
the manufacturers of charcoal iron should
have an organization, if they expect to hold
their own against the influences which are
at work to destroy their industry. The en-
croachments of coke irons and mild steels
upon the field which, a few years ago,
seemed to belong exclusively to charcoal
irons, are serious menaces to the future of
this business in a country where timber is
beginning to have too great a value to per-
mit its permanent consumption as an iron-
making fuel. There remain but few uses
for which charcoal pigs or blooms are indis-
pensable, and, considering the rapid progress

in metallurgical science, no one can say how soon a cheaper metal may not be made to replace them. These are serious considerations for those whose capital is invested in timber lands and charcoal furnaces of one kind or another. Through association they can better reach a solution of the problems they are now forced to consider, than they could hope to through individual action. Collectively they can employ expert talent without burdensome cost, and by united action avert some of the dangers which now menace the whole trade.

Should not every branch of the iron trade have such an organization as that which the charcoal iron manufacturers now propose, and should not all such associations be branches of the American Iron and Steel Association? Years ago we suggested such a movement, but the time did not seem favorable for the carrying out of our suggestion, though we believe it was favorably regarded by the trade at large. The objects of the American Iron and Steel Association are specific and important. All branches of the trade are represented in its management and membership, and all contribute more or less liberally to its support and the furtherance of its work. Can it not be greatly strengthened and its influence broadened by a movement looking to the establishment of as many sub-organizations, or sections, as there are departments of the iron and steel trades desiring the benefits of organizations of their own? Would not this extension and division of its work add vastly to the importance of the American Iron and Steel Association, and make it far more formidable than now as a bulwark for the defence of American industry against the attacks of its enemies?

Emigration and Labor.

The National Ironworkers' Association of Great Britain, at their conference which has just been held at Manchester, took action which may have an important bearing on the labor market in this country. It should be noted that, unlike the conventions of the ironworkers of this country, the results of these meetings—the discussions, reports, &c.—are all given to the public. The accounts of the association showed a fund to its credit of between \$25,000 and \$30,000, and the question was raised whether this fund, or a portion of it, should not be used in assisting members to emigrate. While no definite action was taken on this proposal, it was decided that the members of the lodges should send to the general secretary the names of those who wish to emigrate, and action will be then taken on the question of helping them out of the union funds. A number of the English unions have a standing offer of a bonus, amounting to from \$25 to \$35, to any of their members who will emigrate, so that this idea of relieving the labor market of that country is by no means a new one. It is evident that something must be done to relieve the industrial population of England of its enormous surplus. Many came into the iron trade from agricultural pursuits at the time of the great extension of the English iron industry. Now, when this industry is depressed and thousands are out of work and on the poor rates, they cannot return to the tilling of the land if they would, as agriculture is in a worse state of depression than even the iron industry. The only relief, therefore, seems to be in emigration.

In this connection the question arises, What will be the effect of this emigration on the American labor market? If the emigrants push West and take up unoccupied land and work it, the effect will be beneficial; but if these men emigrate for the purpose of working at the same trades they have left in England, it will have a tendency to overstock the labor market here, and send down prices. It will do this also if the emigration in any numbers increases an element in our labor that has not by any means been conducive to its peace and prosperity. It is said that the strike at Fall River is the work of a faction of Lancashire spinners, who are receiving much higher wages than they ever got at home, and are asking for more. It is also a fact that the most turbulent and unreasonable workmen are those who have been brought up to the ways and sentiments of the English workshops and factories. They are brutal and intolerant, and, generally speaking, are undesirable acquisitions to any trade. There is no doubt, however, that large numbers of English ironworkers are looking to this country as a relief from starvation. Letters received here indicate that our high wages—two to three times in excess of what they receive, while the cost of living is much less—are tempting them over here. Some sections of the country would welcome them, as many manufacturers believe that almost any tyranny would be preferable to that under which they are laboring. The high wages ruling here in some sections are a strong inducement to these men, and it would not surprise us if the present year saw a large number of English ironworkers on their way to this country.

The strike of the Fall River spinners promises to end in the complete defeat of the misguided men who expected to lock the wheels of a great industry, and keep thousands out of employment until their demands were satisfied. The mills have been filling quite rapidly with spinners during the past fortnight, and numbers of new men arrive daily. Some of these are bought off or

frightened away, but most of them find employment, and the manufacturers are experiencing but little difficulty in running the mills. About half the spinning machinery of the city is in operation, and during the present week it was expected that most of the mills would run on full time. Cheap boarding houses have been erected in several of the mill yards, and the new men are thus easily protected against violence. Many of the old spinners are said to be leaving town daily in search of work elsewhere, and while the union maintains a bold front and proclaims its confidence of success, it is evident to outsiders that it is weakening rapidly, and that the result will be its defeat and disruption. A few lessons of this kind should teach the workmen prudence, and show them that strikes are dangerous things, not to be had recourse to except as a last expedient. The disposition manifested by workmen in many trades to seize upon the first indications of a revival in business as a pretext for a strike, is more likely than anything else to delay recovery, and prevent such an advance in prices as would enable manufacturers to pay better wages.

Business Matters in Canada.

It is an interesting fact that the last *Official Gazette* reports the smallest number of failures recorded in the Dominion for many months past. There are only four new cases of bankruptcy. The Canadian newspapers speak hopefully of the condition of business, and especially of the outlook. Collections are easier, consumption larger, and recovery, to judge from present indications, near at hand. The crop promise is good, and manufacturers are better satisfied with protection than they would be if the conditions favored a more rapid development and diversification of the country's productive industries. The Steel Works Company at Londonderry, N. S., have given notice to their work-people that they are about to suspend operations. The reason assigned is that the company cannot afford to pay the rates of freight charged by the Intercolonial Railway, on which they are dependent for transportation. It is asserted, however, that the stoppage is a result of the "National policy" which, by imposing a duty on coal has offset the advantages otherwise likely to have resulted from the duty on iron. But whatever the reason, the fact of stoppage without prospect of soon resuming, shows that the business of the company is unprofitable, and that it does not promise much for the immediate future. We hear of no great eagerness on the part of capitalists to engage in manufacturing operations, and there are, so far as we can see, no indications of rapid industrial progress. The country wants more population and more enterprise, and with these it can make protection profitable. Under the circumstances the party in power seems to have overdone it in adopting a general protective tariff. The industries of the country are not yet sufficiently diversified to make such an experiment profitable. A moderate protection for half the industries it is now sought to protect, would have been very beneficial. The results of the present policy are, at best, uncertain.

The Whitwell Hot Blast Stoves.

The change in the shape of the Whitwell hot-blast stoves to the style known as that of 1878, or the high stoves, appears to have largely increased their efficiency, as well as reduced their cost. This fact, combined with the decreased cost of materials, has reduced the cost of these stoves some 50 or 60 per cent. below what they were at any time prior to 1877. At the present time the first cost of a fire-brick stove is not much, if any, in excess of a good iron stove of the same number of square feet of heating surface, while every other element—effectiveness, cost of repairs, quality of product, &c.—is largely in favor of the fire-brick stove. These considerations are leading to the adoption of these stoves at nearly every new furnace that is constructed and at many old ones. In addition to the three constructed for at the Powel Furnace, in the Broad Top region, mentioned elsewhere, they are to be adopted at the Lowmoor Furnace, Virginia, which is now building, and also at the furnaces of the Reading Iron Company. Negotiations are in progress also for their erection at several other points in the anthracite region. The three new stoves at McCormick's furnace, near Harrisburg, are nearly completed, and similar stoves will be at once built for No. 2 furnace at the same works. The stoves to be erected at the Powel Furnace will exceed by 5000 square feet of heating surface any Whitwell plant now in the United States. The high stoves of 1876 are also coming into favor in Europe. A recent letter from Mr. W. Whitwell to Mr. J. P. Witherow says: "It may interest you to know that the high stoves of 18 by 40 feet, 18 by 50 feet and 18 by 60 feet high are being applied on the Continent. Messrs. Cockerill & Co., of Seraing, who have worked two furnaces on Bessemer direct for the past five years, are now erecting the tall stoves of the 1876 patent. A firm in Austria are doing the same. Our European firms are ordering the valves of the old make from our neighbors, Head, Wrightson & Co., whose facilities for manufacturing them are so great."

There are still some unsettled questions regarding the heat at which it is best to run these and other fire-brick stoves, but as to their superiority and economy over iron stoves at the present cost of construction, there seems to be no question in the mind of the trade.

The Oil Stove Controversy.

We have received the following letter:

NEW YORK, July 15, 1879.

To the Editor of *The Iron Age*.—DEAR SIR: We have noticed in *The Metal Worker* and also in *The Iron Age*, articles regarding the oil stove litigation that appeared to be intended to injure us. We cannot assume that you would knowingly be a party to this. While we have no objection to your publishing any circulars that may be sent you, we do take exception to your drawing adverse editorial conclusions from them without first hearing our side of the question. The facts are as follows: We are the owners of the Fish and Billings patents, and are advised by our own counsel that they cover every oil stove so far submitted to them. Both of these patents have been in litigation for more than three years, and one of them has been decided and redecided in our favor after determined resistance, by most eminent patent lawyers, and under both patents the United States courts have granted us numerous injunctions. Under these patents we have already effected settlements with more than 700 dealers without suit, and with nearly 100 more after suit, in which cases costs were added to our royalties. We shall continue to pursue this course, requesting a settlement from all parties on a fair basis; but where they refuse this, we shall sue them, giving whatever bonds may be necessary to collect any just claim, though it be but \$1. As to the estimate in which our patents are held we can perhaps give you no better idea than to refer you not only to the list of dealers who have settled, but to the list of our licensees, which embraces nearly all the large manufacturers of oil stoves in the country.

In publishing the joint circular of four oil stove manufacturers last week, you stated that they were acting in good faith. Such is not the case. On the contrary, while they have in some cases assumed the defense of suits brought against their customers, they have in every instance, so far as we are informed, refused to give any customer such a legal guarantee of protection and security as would save him harmless in case of an adverse decision. Yours, respectfully,

THE KEROSENE LAMP HEATER CO.
By A. H. TIFFT, President.

The following circulars would have appeared in our issue of last week had they been received in time:

To Dealers in Kerosene Oil Stoves.—We again warn you against dealing in any oil stoves, except such as are made or licensed by us. We also caution you against accepting either the verbal, printed or written assurances of infringing manufacturers that they will protect you.

The Billings patent No. 45,957 does not expire until January 17, 1882, and up to that time we shall hold dealers responsible for every infringing stove they have sold or may sell; and as the manufacturers thereof (having given assurances of protection throughout the country) may not be able to indemnify all their customers, at the end of protracted and expensive litigation, a bond of indemnity, signed by parties known to you to be thoroughly responsible, would be your only sure protection.

Every stove sold after June 17, 1879, that is manufactured under license from us, should have our license tag affixed as follows: "Licensed by the K. L. H. Co., patented, Jan. 17, 1865, under the Billings patent."

As to past infringements, you are requested to fill up the blank statement herewith inclosed in such a manner as to show the number of oil stoves bought by you to date, of each different make; the number of each sold and the number now on hand and of whom bought.

On receipt of this statement we will advise you how many of such stoves have been exempted by payments already made to us by manufacturers or jobbers, and the amount claimed by us for an amicable settlement. We desire to avoid making you any unnecessary trouble and expense, and a prompt attention to this matter may save the necessity of commencing suit against you, the result of which would largely increase the amount necessary to a settlement, as the costs and expenses in patent litigation are heavy.

A reading of the claims of our patents, as recited on the succeeding page, will show you at once that they cover every kerosene stove manufactured.

THE KEROSENE LAMP HEATER CO.
THE FISH PATENT NO. REISSUE 7060—REISSUED APRIL 18, 1876.

1. The combination, substantially as herein shown and described, of a kerosene oil lamp, deflector or cone, and a metallic heating chamber or shell, adapted to support a vessel to be heated.

2. A kerosene oil lamp heater in which the deflector or cone of the lamp is arranged in the bottom of a metallic heating chamber or shell that is adapted to support the vessel to be heated.

3. The combination of a kerosene oil lamp, a deflector or cone, and a metallic heating chamber under the arrangement, substantially as herein shown and described, so that the air for the sustenance of the flame in the heater shall be admitted through the bottom of the heater, and the products of combustion shall pass off through a contracted opening in the top of the heater.

THE BILLINGS PATENT NO. 45,957—JANUARY 17, 1865.

1. The use and adaptation of the body or sides of the stove or range D to serve as and perform the office of a flue or chimney over the lamp or oil holder A, substantially as described and for the purposes set forth.

2. The attaching of one or more air guides, cones or deflectors in the diaphragm C, and the adjustment of the same in the stove or range F, substantially as described and for the purposes set forth.

2. The arrangement of the diaphragm C and g g, thus forming an air chamber between the oil holder and stove or range, substantially as described and for the purposes set forth.

4. A non-conductor of heat, used as a packing between the stove and the oil holder, arranged substantially as described and set forth.

5. The insulation of the lamp or oil holder by non-contact with the heater, stove or range, substantially as described and set forth.

NEW YORK, July 1, 1879.

We have granted licenses under the Billings Patent, No. 45,957, to the following named parties, who will affix our license tag as under to all kerosene oil stoves hereafter made by them: Bradley & Hubbard Mfg. Co., West Meriden, Conn.; Florentine Oil Stove Co., New York, N. Y.; Haberman, F., New York, N. Y.; Hull, W. A. & Bro., New York, N. Y.; Myers, Osborn & Co., Cleveland, Ohio; Pool, Geo. & Sons, Brooklyn, N. Y.; Ray, Daisley & Co., Brooklyn, N. Y.; Richmond Stove Co., Norwich, Ct.; Riessner, C. & Co., New York, N. Y.; Tift & Howard, New York, N. Y.; Tulley, Francis, Rochester, N. Y.; Williams, J. S., Brooklyn, N. Y.

We again warn the trade that the sale of any kerosene oil stoves not made by our licensees is in violation of our rights, and that we shall hold each dealer responsible for every such stove sold by him.

The following named parties have also settled with us in full for past infringements of the Fish and Billings patents, so that no claim will be made by us against any of their customers on stoves made by them: Bradley & Hubbard Mfg. Co., W. A. Hull & Bro., Myers, Osborn & Co., Geo. Pool & Sons, Ray, Daisley & Co., Ray, Forder & Co., Richmond Stove Co., Tift & Howard, Francis Tulley, Florentine Oil Stove Co.

THE KEROSENE LAMP HEATER CO.
A. H. TIFFT, President.

Mr. Tift authorizes us to correct what he assures us was a misstatement in our comment on the joint circular of several oil stove manufacturers, published last week, to the effect that the Kerosene Lamp Heater Company have thus far failed to comply with the requirement to give security for costs in all suits brought by them against dealers. Mr. Tift says that the company have given such security in every case in which it has been required, and shall continue to do so. They have undertaken in good faith the defense of their patents against all comers, and profess to be quite willing to have the value of the Billings patent tested as soon as possible.

Failures in the United States Since January 1st, 1879.

Messrs. R. G. Dun & Co. send us the following synopsis of their report on failures and the condition of trade for the first half of 1879:

The failures for the second quarter in the present year are 1534 in number and \$22,000,000 in amount of liabilities. These figures are notably less than in any single quarter of the past five years. As compared with the second quarter of 1878, the difference in favor of the last three months is very marked, indicating a decrease of over 900 failures in that period, with a decline in liabilities of \$26,000,000 in the quarter—a lessened loss or lock-up by bad debts of over \$2,000,000 per week.

In order, however, to show the figures in more detail, and to enable the reader himself to institute comparisons, the following table is compiled, showing the figures of failures in each second quarter since 1876, also the failures for first six months of each year since that date, together with the average liabilities for the quarterly periods:

Year.	Second Quarter.			Six Months.		
	No. of Failures.	Amount of Liabilities.	Average of Liabilities.	No. of Failures.	Amount of Liabilities.	Average of Liabilities.
1876.	1,794	\$43,771,273	\$24,398	4,600	\$108,415,429	\$23,568
1877.	1,880	45,068,097	21,972	4,749	90,606,171	19,090
1878.	2,470	46,753,940	19,738	5,825	130,832,706	22,632
1879.	1,534	22,000,725	14,779	4,058	65,779,308	16,212

It will be seen by the foregoing that for the first six months of 1879 the failures in the United States were 4058 in number, as against 5825 for the first six months of 1878. The liabilities in the same period of this year are only \$65,000,000, as against \$130,000,000 for the first six months of last year. The difference in favor of 1879 is, therefore, that there have been nearly two thousand (1969) less failures, while the extent of liabilities shows a decrease of over \$65,000,000—precisely one-half of what they were in the first six months of 1878. Not the least gratifying feature is the marked reduction in the average indebtedness of each failure, as shown by the foregoing table.

To show how completely reversed is the condition of trade, so far as indicated by these statistics, as compared with last year, we quote a sentence contained in our circular issued this day one year ago, referring to the failures of the first half of 1878: "These figures of increase in failures and liabilities are of very grave import, for never before, in an equal period in the history of the country, have business misfortunes been so numerous, or aggregate an amount of loss by bad debts so great." Today, in contradistinction to this gloomy picture, it is our great good fortune to say that never before in our experience in the compilation of these statistics has the decrease in mercantile casualties been so marked; in no previous period has the comparison of losses by bad debts been so favorable, as at the present hour.

The indications are numerous on every hand of an improved condition of business, yet none are more significant than the decrease in failures. Aside from the direct losses of large sums through misfortunes of this character, the amount locked up in estates awaiting adjustment is a most serious withdrawal from active capital. But even greater than this is the effect upon the confidence so essential to business pursuits. Numerous failures retard business ventures in a greater ratio than any other single circumstance, while the probability of lessened disasters begets faith in the future, and this feeling of safety contributes almost

as much as an incentive to transactions as the hope of gain. The decline in values, and the absence of remunerative profits experienced in all branches of business during the last two years, served to intensify the anxiety always felt when losses by failure are frequent or even probable; but now that the figures above submitted reveal such a marked improvement, as compared with the losses chronicled in previous years by bad debts, another element is added to the growing confidence already manifesting itself, especially when taken in connection with the present steadiness in prices, improvement in values of many staples, and the evident growth in the volume of business.

In relation to the growth in the volume of business in the past six months, as compared with the transactions of the same period in 1878, the circular before us contains returns from all the clearing houses in the country, some 22 in number, located in the chief centers of finance. From figures it appears that the total settlements, or balances to be adjusted between the various banks, indicated an increase of business all over the country exceeding 20 per cent. There are 7 out of the 22 cities whose returns show a decrease in the six months from local causes, which in the next six months may not prevail; but that the total result should in the six months show a gain of one-fifth, notwithstanding these local influences, is next to the failure figures themselves, a very satisfactory showing.

A New Broad Top Furnace, and Broad Top Coke.

An enterprise of some importance in its relations to the future iron industry of Pennsylvania, is already under way in the Broad Top region of that State. Mr. Robert H. Powel has just let a contract to Mr. J. P. Witherow, of Pittsburgh, the representative in America of the Whitwell stoves, for the construction of a blast furnace on his property. The furnace will be 70 x 18 feet, with three Whitwell stoves of the 1876 pattern, each 60 x 18 feet, having 13,750 square feet of heating surface, or over 41,000 feet for the plant. It will be blown by two horizontal engines, coupled to one fly-wheel, with blast cylinder 6 x 6 feet, to be built by the Reading Iron Company, and six French or double boilers, the upper boilers being 50 feet long and 40 inches in diameter, and the lower 50 feet long and 36 inches diameter. There will be a combustion chamber 5 feet high under the boilers, and the structure inclosing them will be 16 feet in height. The engine house is to be 73 feet long, and roofed with a wrought-iron water tank. The casting house will be 112 x 60 feet. The chimney will be 175 feet in height and 8 feet inside diameter. The hoist house will be an iron structure 78 feet high, roofed with corrugated iron. The furnaces will have all of the modern improvements, and will be constructed with a view to a possible increase in the number of stacks.

This Broad Top coal region, concerning which there has been considerable discussion in the past five years, is an isolated deposit on the eastern slope of the Allegheny Mountains, some 25 miles east of the Allegheny field. The Report of the State Geological Survey of Pennsylvania makes this a part of the Pittsburgh coal bed. The field occupies about 80 square miles, and affords two seams well fitted for the production of bright, open, tenacious and strong coke. Coke made from washed coal from this region is used at the furnaces of the Kemble Coal and Iron Company, at Riddlesburg, the ordinary beehive oven being used in the coking. The coke for the furnaces to be erected by Mr. Powel will be made in improved Belgian ovens. This will give the new enterprise considerable importance, and furnish data that will be very valuable for comparison. A test of the coal to be used has been made in the Belgian ovens at the Eliza Furnaces, Pittsburgh. The first oven was drawn on the 1st inst., the result being a yield of over 75.4 per cent.; that is, 100 pounds of the washed Broad Top coal gave 75.4 pounds of a splendid hard, compact coke. This surpasses the yield of Connellsville when made in beehive ovens. The loss in washing in this instance we have not been able to learn. At the Kemble Furnace it is, or was in 1875, 11½ per cent. If this is considered the waste in coking, Broad Top will be somewhat in excess of that in coking Connellsville, which is not washed. It is further true that Broad Top coal, coked in beehive ovens, yields in practice, according to Report L of the Pennsylvania Survey, 63 per cent. only, which is no better, if as good, as Connellsville. If the yield of 75.4 per cent. can be maintained in practice, it will be very much in favor of the Belgian ovens.

If the Broad Top coke proves in these ovens to be equal, or very nearly so, to Connellsville, it will at once open up a good trade for this region in supplying those Eastern furnaces which have been using coke as a mixture with anthracite. So far, however, as tests have been made the chances are against it. Mr. Fulton, of Cambria, prepared a table showing the relative value of different cokes for blast furnace purposes, which was published in our issue of January 16th, 1879. From the experiments of Mr. Fulton it appeared that the height of a furnace charge that could be borne without crushing, as shown by three samples of Broad Top coke, was 96, 88 and 80 feet, respectively, while Connellsville gave 114 feet. On the other hand, the percentage of cells in the Broad Top is in excess of that in Connellsville. These facts will give to Mr. Powel's venture considerable interest, and the results will be closely watched both East and West.

The Finances of Western Australia.

The financial condition of the colony of Western Australia is very unsatisfactory, the returns for the last year showing an excess of expenditure over revenue to the extent of \$158,000, viz., expenditure, \$930,000, and revenue \$1,088,000. The deficit, however, will be reduced by the repayment out of the recent loan of a sum of \$68,000, advanced on the Champion Bay Railroad. On the other hand tenders have been invited by the Government for the construction of a line of railway from Fremantle to Guildford, a distance of about 20 miles, and other extensions of the roads and railways of the colony are in contemplation.

An Organization of Charcoal Iron Producers.

The Philadelphia *North American* of the 11th inst. contains the following:

The manufacturers of charcoal pig iron and blooms, unlike other branches of the iron trade, have hitherto been without an organization. Appreciating the advantages of frequent communication with their fellow-manufacturers, some of the leading members of this important branch have recently agitated the formation of an association. A call for a meeting was accordingly issued, in pursuance of which representatives of the trade assembled at the Continental Hotel yesterday morning at 10 o'clock. The necessity for more frequent intercourse with one another was conceded by all present, and a general expression of opinion in favor of an organization was manifested. Among the objects to be accomplished by periodical meetings of those in the trade are the improvement of processes of manufacture, and an extension of the business in which they are engaged. The makers of charcoal pig iron and blooms are necessarily more isolated than the manufacturers of other kinds of iron, and hence they have but little opportunity, under ordinary circumstances, of making one another's acquaintance. Their limited trade does not permit them to take advantage of the services of scientific metallurgists. Owing to many circumstances, the past few years have witnessed a heavy decline in the quantity of charcoal pig iron manufactured. These matters were all discussed, and all present felt that it was necessary that something should be done to advance their interests, and that it could only be done through an association. Inroads have been made upon the charcoal pig iron trade by makers of anthracite and coke pig irons, who claim that special qualities of iron can be made which will answer the purposes for which charcoal irons were at one time deemed indispensable. On the other hand, the charcoal iron manufacturers are threatened by the makers of mild steel, who are seeking to supplant bloom irons. All these matters can be thoroughly inquired into by an active and wide-awake association, and improvements can be effected by intelligent co-operation which will do much to enable charcoal iron manufacturers not only to hold their present trade, but to extend it to its former proportions. The laws of Pennsylvania do not protect this branch of the trade as much as they should.

A very slight punishment is imposed on persons who willfully set fire to forests, yet every year much valuable timber is wantonly destroyed by hunters, tramps and others. In some places people who do not own a foot of land set fire to forests and burn up the undergrowth, so that grass may spring up afterward to feed their cattle; yet these fires destroy shoots and saplings which would in a few years supply the place of the timber cut for charcoal.

Among the persons present at yesterday's meeting were A. Wilhelm, Cornwall, Pa.; Geo. B. Wiestling, Mont Alto, Pa.; J. C. Fuller, Pine Grove Furnace, Pa.; Robert Valentine, Bellefonte, Pa.; A. G. Curtain, Jr., Roland, Pa.; R. H. Lee, Lewistown, Pa.; H. T. Townsend, Philadelphia, Pa.; J. W. Mumper, Barre Furnace, Pa.; W. H. Clymer, Temple, Pa.; J. K. Spang, Lenhartsville, Pa.; Frank McCoy, Milesburg, Pa.; Seidel Bros., Maryville, Pa.; C. E. Coffin, Murkirk, Md.; L. Heber Smith, Joanna Furnace, Pa.; Charles Goodman & Bros., Atglen, Pa. Letters were received from parties in other States sympathizing with the movement.

On motion of Mr. Wiestling, Mr. Valentine was elected president of the preliminary meeting and Mr. Coffin secretary. The following resolutions, presented by Mr. Fuller, were adopted:

"Resolved, That a committee be appointed by the president to draft a constitution and set of by-laws for the organization of the National Association of Charcoal Iron Manufacturers, to report at a meeting to be held on Thursday, the 15th day of September, 1879, at 10 o'clock a. m., in Parlor C, Continental Hotel, Philadelphia.

"Resolved, That to the same committee be referred the nomination of officers for the permanent organization.

"Resolved, That the present officers of this meeting hold over until the organization of the association is effected and their successors are elected, and that we be subject to their call for an earlier meeting if a necessity arises for the same in their judgment.

"Resolved, That notices be sent to every charcoal iron manufacturer in the United States, inviting them to attend the meeting and to co-operate with us.

The president appointed Messrs. Fuller, Wiestling, Townsend and Coffin upon the committee. On motion, the president was added to it. The meeting then adjourned.

In a list of Philadelphia exhibitors at Sydney we find the following: Baldwin Locomotive Works, locomotives; Wm. Sellers & Co., iron working machinery; Edgemoor Iron Works, iron and steel bridges; A. Whitney & Sons, car wheels and axles; Henry Diston & Sons, saws, files, &c.; Hoopes & Townsend, bolts and nuts; Samuel S. White, dental instruments and materials; Mackellar, Smiths & Jordan, type, &c.; John Lucas & Co., paints; Enterprise Manufacturing Co., specialties in hardware; American Chain Co., iron chains; J. W. Daughaday & Co., printing presses; Baeder, Adamson & Co., glue, &c.; Goodell & Waters, woodworking machinery; Keystone Bridge Co., bridges; Myers & Ervine, steel forks; Philadelphia Novelty Manufacturing Co., novelties in hardware; American Sewing Machine Co., sewing machines; Yerkes & Plumb, edge tools; Sheble & Fisher, steel forks; Graham, Emien & Passmore, lawn mowers; D. K. Miller Lock Co., locks; Barrows, Savery & Co., hollowware; P. P. Mast & Co., grain drills; Kimball & Kimball, hand sewing machines; Cooper, Jones & Cadbury, brass faucets.

Italy is about to enter upon an era of railroad building, and though her operations will not be upon a very extensive scale, still American manufacturers might find it worth while to take their wares to that market.

The World's Telegraph System.

The twelfth International Telegraph Conference has lately been in session in London. This body, formerly made up of representatives chosen, as a rule, because of their experience in diplomacy, now consists chiefly of practical telegraphers and the working officers of the postal and telegraphic departments of the different governments. The conference, therefore, is not so much of a show concern as it was in other years; but in expert knowledge of the subject, it makes up for any loss of ribbons and garters.

It is easy to understand the need of such a conference at a time when a considerable share of the correspondence of the world, and the most important part of it, is done by telegraph, and when all the nations of the earth are bound together by electric wires. What shall be done with these lines in time of war, and in peace how shall the rates for the transmission of messages be so adjusted as to satisfy business interests and avoid the complications of different currencies? These are questions which already had been more or less determined at previous meetings of the conference. At the present session the main subjects for discussion were to be the policy of employing a new word tariff, and the possibility of further reducing charges.

Leaving out the land lines which connect all the civilized countries of the world with their neighbors, there are now over 70,000 miles of cable crossing the seas and oceans. New submarine telegraphs, rivaling in length the greatest now existing, are soon to be laid. A line from San Francisco to the Sandwich Islands, and thence to Japan—where now 5000 miles of wire are in operation, though the first were only laid 10 years ago—so as to connect the island groups of the Pacific with the continents of Asia and America, will complete the telegraphic circuit of the globe. The King of the Sandwich Islands has granted a concession for the first part of this final link, and it will not be many years before we shall see it in working condition.

To reduce to complete order and symmetry this vast system of telegraphic communication, which has had its chief development within the short space of less than a quarter of a century, is the main business of the International Telegraph Conference. The charges for international telegraphy are still too great, though they have been heavily reduced since the Paris Convention of 1865. That convention abolished the zone system, as it was called, under which each country crossed by a message was divided into zones, the first 50 miles and the succeeding ones about 100 miles in breadth. The principle of mean rates for each country was substituted, and at the same time tariffs were much reduced, the charge for 20 words between London and Constantinople, for instance, declining from \$4.75 in 1854 to \$2.25 after the Paris Convention. At the Convention at St. Petersburg, in 1875, the principle of mean rates was still further extended, so that now a mean charge to cover the transit over any distance in Europe is collected on messages sent to the East.

What it is now desired to bring about is the further development of this principle, so that there shall be a mean telegraph rate of so much per word between the different States of Europe, resembling the mean rate for letters established by the Postal Union. But until science has greatly multiplied the carrying capacity of a single wire, we cannot hope to see the rates for telegraphic dispatches reduced to a level with those charged for the postage of letters. Such a cutting down of prices, as the London Iron remarks, would inevitably crowd the telegraphic companies, land and marine, with a mass of messages beyond the power of their existing wires to carry, and require additional cables, which would not be likely to return a profit on the outlay. The hope of the future is in the great increase of the number of messages which may be sent over a wire, and it is not likely to be disappointed.

Technical Education in England.

The advantages of technical education have been made more apparent in Europe than in the United States, because of the greater difficulty in securing remunerative employment. The ability to labor counts for little. Skill is at a premium everywhere. The report for the past year of the Textile Industries Department of the Yorkshire College, England, endowed by the Clothworkers' Company, of London, will give our readers an idea of the practical character of the instruction afforded to pupils. It says: "Five new power looms and 15 large hand-loom looms are now at the disposal of the students, and the whole process is made a study by both day and evening classes. A loom was also mounted for weaving Kidderminster carpets, and another for producing heavy-figured nap coatings. The patterns woven during the session amounted to upward of 700, an increase of 300 over the previous one. Each student has the privilege of carrying home in his pattern book a switch of all the 700 patterns, with every particular as to size of yarn, both warp and weft, beat, plan of weave, picks per inch, &c., giving him an invaluable amount of information for future use. The variety of goods woven by the students of the advanced classes included figured cotton warp naps, worsted and woolen trousseings, both in single and double cloth; cotton warp, wool and worsted mat-classes, worsted and cotton warp; wool and worsted felt mantle cloths, in various kinds of fabrics; plush goods, both cut and uncut; feather trimmings, seal skins, ladies' dress goods, fancy vestings and Kidderminster carpets. A considerable number of designs were produced, and thirty of these, ranging from 96 to 384 shafts, were sent in to a competitive examination for prizes. Number of examples given in small weaves, 160; do. do., combinations, 170; number of designs made by the class to compete for prizes offered by the authorities of the college, upward of 50. Numerical summary of the Textile Industries Department of the college for the session: Day students, 35; evening students, 42; total, 77." Industrial schools of this kind are calculated to afford

pupils a kind of knowledge from which they are shut out by the present system of operation in factories, where, instead of mastering his craft, the workman becomes an adept in only a single branch of it.

The Cincinnati Exposition.—We have received a very elegant pamphlet containing the prospectus, rules, classification and premium offers of the Cincinnati Industrial Exhibition of 1879. The cover is one of the most tasteful and brilliant specimens of ornamental lithographic printing we have ever seen. We understand that this exhibition gives every promise of being a great success this year, and that it is looked forward to with interest by a large number of intending exhibitors.

Special Notices.

Second-Hand & New Tools FOR SALE.

July List.

The Tools in the following list are all of Wood, Light & Co.'s make, have been used, but are all in good order and will be sold very low:

Five Engine Lathes, 15 in. swing 6 ft. bed.
Six Engine Lathes, 20 in. swing 7 1/2 ft. bed.
Five Engine Lathes, 20 in. swing 8 ft. bed.
One Engine Lathe, 21 in. swing 6 ft. bed.
One Engine Lathe, 21 in. swing 16 ft. bed.
One Engine Lathe, 24 in. swing 12 ft. bed.
One Engine Lathe, 28 in. swing 12 ft. bed.
Two Upright Drills, 27 in. swing, not geared.
One Upright Drill, 22 in. swing, not geared.
Two Planers, 22 in. x 30 in. x 8 ft.
One Planer, 22 in. x 30 in. x 10 ft.
One Planer, 27 in. x 37 in. x 10 ft.
One Planer, 42 in. x 36 in. x 15 ft.
One Planer, 72 in. x 36 in. x 24 ft.
One Shaping Machine, 12 in. stroke.
Four Bolt Cutters, various sizes.
One Horizontal Boring Lathe.

The following are all new tools to be sold very low, and are all Wood, Light & Co.'s make:

One Engine Lathe, 20 in. swing, 20 ft. bed.
One Shaping Machine, 14 in. stroke.
Seven No. 2 Bolt Cutters.
One No. 1 Bolt Cutter, with centers.
Five No. 2 Bolt Cutters, with center.

Also the following miscellaneous Tools:

One Portable Engine, 6 in. cylinder.
One Hand Milling Machine.
One "Pond" Index Milling Machine.
Three Chase Patent Pipe Cutting Machines.
Two Engine Lathes, 15 in. swing, 6 ft. bed.
Two Engine Lathes, 20 in. swing, 8 ft. bed.
One Engine Lathe, 15 in. swing, 6 ft. bed.
Three Engine Lathes, 20 in. swing, 8 ft. bed.
Six Turning Lathes, 14 in. swing, 4 1/2 ft. bed.
Three 4-spindle Drills.
One Gear Cutter. One new "Hardway" Bolt Heading Machine, to head up to 1 1/2 in. bolts. One new "Hardway" Bolt Heading Machine to head up to 1 1/2 in. bolts. A lot of Saw Tables and Wood Working Machinery.

Please specify which of the above tools you want and we will forward all particulars.

The above tools will be sold very low, and can be seen at

The Geo. Place Machinery Agency,

121 Chambers and 103 Reade Sts.,

NEW YORK.

Rolling Mill for Sale

The real estate, machinery and fixtures of the Portland Rolling Mills are offered at private sale until the first of August, after which time, if not disposed of, they will be sold at public auction in the city of Portland.

The property of the company consists of 50 acres of land on the tide water of the town of Cape Elizabeth, Cumberland County, within ten minutes drive of the city of Portland. Besides the mill buildings the company owns 55 tenements in buildings, one house used for church purposes, two stores and a thoroughly well fitted office, with fire-proof vault and all modern improvements. All these buildings are in good repair.

The mill contains one 10-inch train, and one 18-inch train, with all the machinery appertaining to the manufacture of rails and bar iron. Its capacity is 24,000 tons of iron rails, or 6000 tons of merchant iron per year.

The property is provided with a thoroughly built wharf, at which vessels of 500 tons capacity can lie at low water, and is directly connected by rail with all the railroads centering at Portland.

The mill is now in active operation, but possession will be given about the 1st of September. For further particulars, terms, &c., apply to

PHILIP HENRY BROWN, Pres't.

Portland, Maine.

For Sale,

AT AUCTION, THURSDAY, July 24,

At 2 o'clock.

JOSEPH WARREN, Auctioneer, No. 331 Grove street, Jersey City.

A plot of ground containing 15 city lots, 25 x 100, on Henderson street, between 13th and 14th streets, suitable for manufacturing purposes; located in Jersey City, between the Erie and the Delaware and Lackawanna Railroads. No piling; solid ground. A Spring of water at 14 feet. Suitable for a sugar house or brewery. Convenient to water front and dock.

Also, one large dwelling house and machine shop.

Address, A. C. DURBIN,

Montclair, N. J.

LEHIGH UNIVERSITY.—TUITION FREE.

Civil, Mechanical and Mining Engineering; Chemistry; French and German; English Literature; International and Constitutional Law; Psychology and Christian Evidences. For Registers address The Rev. JOHN M. LEAVITT, D. D., Bethlehem, Pa.

HARDWARE BUSINESS FOR SALE.

Located in the county seat of one of the best counties in central Iowa. Population of the town about 7000. Established in 1853. Three railroads. Stock consists of shelf and heavy Hardware, Wagon and Buggy Wood Stock, Iron, Steel, Nails, Glass, &c. Stock in perfect order (no old goods), doing a good, safe business. The only stock of the kind in the county. Will invoice from \$5000 to \$50000. Satisfactory reasons given for selling.

Address, B. & M. BRO. & CO.,

Office of The Iron Age, 83 Reade St., New York.

WANTED.—A first-class Bookkeeper is open to an engagement; has had full charge 13 years of large Jobbing Hardware House. Firm going out of business. Thoroughly reliable and competent. References as to capacity and integrity A1. No objection to leave the city.

Address, L. A.

Office of The Iron Age, 83 Reade St., New York

Special Notices.

PARK BENJAMIN'S
Scientific Expert Office,
37 Park Row, New York.

PARK BENJAMIN, Ph. D.,
Editor Appleton's Cyclopaedia of Applied Mechanics; late of Scientific American.

Testing, Designing, Construction and Selection of Machinery.
Editing and Publication of Trade Literature and Scientific Works.
Expert Mechanical and Scientific Evidence in Law Suits.
Expert Advice on Inventions and on all Scientific and Mechanical Subjects.
Engravings, Chemical Analyses, Assays.
Factories fitted up. Selection and purchase of Laundry Machinery and Supplies.

Valve Refitting Machines.

All users of Globe Valves should have one. Send for circular and price list.

A few good agents wanted to sell on commission.

GRISCOM & CO.,

Pottsville, Pa.

A GENTLEMAN

with 10 years' experience in the manufacture of Merchant Iron and Pig Iron, fully competent to take charge of any department of office work, desires to form a connection with some reliable firm in the Iron or Hardware Trade. References first class.

Address, C.

Office of The Iron Age, Cincinnati, Ohio.

A PARTY

having an established trade in Chicago, having plenty of room, wishes to get an agency of a good line of goods. Present business is with the Hardware and furniture trade. Is prepared to handle goods on very close margin, and will assume responsibility for all sales made.

Address for two weeks.

CHICAGO AGENCY,

Office of The Iron Age, 83 Reade St., N. Y.

Rolling Mill for Sale,

Lease, or will take a partner; location not excellent; ready for immediate business; six months' advance; a rare opportunity. Full particulars by addressing

Office of The Iron Age, 83 Reade St., New York.

Sanderson Bros. Steel Co.

A limited number of shares for sale by

EDWARD FRITH & SON,

241 Pearl Street, New York.

For Sale.

One Ferris & Miles Steam Hammer, two-ton, 17-inch cylinder, 48-inch stroke, used six months; good as new. Address

J. M. AYER,

72 Washington Street, Chicago, Ill.

For Sale.

The machinery complete of the Chicago Plate and Bar Mill Company, all in first-class order. Will be sold very cheap. Terms easy.

Address, J. M. AYER,

72 Washington Street, Chicago, Ill.

Farming and Mineral Property

for Sale.

Four hundred acres, beautifully situated on James River, five miles below Lynchburg, large dwelling, orchard, &c. It adjoins the celebrated Mt. Athos and Chestnut Mountain Iron Mines, covering the same vein. Eighty acres river low grounds. The best quality of farming and grazing lands. Price, \$15,000. Address H. A. OLNEY, Mt. Athos, Campbell Co., Va.

Hardware Establishment for Sale.

A rare opportunity to purchase an 18-year established business in one of the most thriving villages in Central New York, with good, clean stock, including Hardware, Paints and Stoves, of about \$2000. Conveniently located to do a jobbing business, which, as well as retailing, has a good and permanent trade. The brick store, built and furnished with cellar and three stories, expressly for the business, can be purchased or leased for a term of years. Address "Hardware," Lock Box 1055, Oneida, N. Y.

For Sale.

All the Deck Beams of the old Elevated Railroad on Greenwich street, from Twelfth street to the Battery, in lots to suit purchasers. Also any other part of the ironwork connected with the road, excepting the rails.

Apply to

HARRISON & GILLOIN,

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CALIFORNIA AGENCY.

A San Francisco firm of File and Tool makers having an agent constantly traveling among the consumers in the State and West Coast, is desirous of representing some first-class Eastern Houses in the manufacturing hardware trade.

Address, AGENCY, 248 Beale St.,

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For Sale,

1032 1/2 Wm. Wright Engine,

153 1/2 foot Pitkin Boil. Boiler.

With fixtures complete, nearly as good as new. Can be seen in operation at our factory.

STILES & PARKER PRESS CO.,

Middletown, Conn.

HARDWARE BUSINESS FOR SALE.

The stock and store in a fine town in Western New York; established over 25 years. Store a very handsome one, in perfect repair, and built expressly for the business. The stock is an exceptionally good and clean one, has no poor goods and will invoice about \$4000. Good reasons will be given for selling. To a good party a rare chance is here presented to secure at once a fine and prosperous business. Address,

HARDWARE, Box 93,

Office of The Iron Age, 83 Reade St., New York

WANTED.

Special Agency for Sheffield, England, and surrounding country, of Machinists' Lathes and Tools.

Address,

ALBERT HARRISON,

Sheffield, England.

JUST PUBLISHED—SENT FREE.

Complete History of Wall Street Finance, containing valuable information for investors. Address BAXTER & Co., Publishers, 17 Wall Street, New York.

Special Notices.

One 9-inch Train Rolls,
One 16-inch Train Rolls,
Both with Housings.
One Steam Hammer,
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One Hot Steel Ingot Molds,
Three Large Woodward Steam Pumps,
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One Half-hall Condenser,
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Deck Pumps, Low Pressure Gauges,
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(5% to 8 1/2% and all the combinations).

Arranged in three parts:

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Every business man buying or selling by "LIST AND DISCOUNT," should have this book.

Mailed postpaid to any address for ONE DOLLAR.

Address, EDWARD B. LEIGH,

St. Louis Elevator, St. Louis, Mo.

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The Sherman Process Co.

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Issue Licenses to use the Process for the

Manufacture of Iron and Steel

In the Bessemer Converter, Crucible, Siemens-

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The use of this Process improves the quality of

the product, saves fuel and labor, and does not require

any change in furnace or manner of working.

See page 17 of The Iron Age of Oct. 25th, 1877.

AUSTRALIA AND NEW ZEALAND.

Wm. S. Fell & Co.,

Importers and Auctioneers.

No. 275 George St., Sydney, Australia.

Request correspondence with American manu-

facturers desirous of being represented in the Aus-

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Consignments solicited and prompt attention

promised, and 60 day drafts against same for 50

per cent, through Bank of British North America

New York City, will be honored.

All the principal points in the Colonies are visited

regularly by our travelers

JENNINGS'S DISCOUNT BOOKS.

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Counting House Edition (former price, \$3), size,

9x11

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, July 16, 1879.

The past week has been one of unusual activity in Wall street, considering the extreme heat and the number of operators absent, and the dealings in the various markets have been characterized by considerable firmness of tone. The money market has been very easy, and rates have ruled in favor of the borrowers. Call loans have ranged 1 @ 2 % on pledge of government bonds, and 2 @ 4 % on miscellaneous securities. Mercantile paper is quoted at 3 1/2 @ 4 1/2 %.

Government bonds have developed strength within a few days, partly in sympathy with the London market and partly on account of the announcement that the First National Bank had concluded the sale to Messrs. J. S. Morgan & Co., of London, through Drexel, Morgan & Co., of the entire remainder of the United States 4 per cent. taken by the syndicate formed in April last. The amount sold was \$12,100,000 at a price equivalent to about 101 1/4, New York quotation. Settlements of bond transactions with the Treasury are going forward smoothly, and no apprehension of disturbance is felt. There need be none, as it is within the power and to the interest of the Treasury to keep the money market easy. Railroad mortgages have been strong, with an upward tendency. Below we give the closing quotations of governments.

The stock market has been strong, the Granger railway shares leading on the prospect of large earnings from the movement of abundant crops. Coal shares are weak, and telegraph shares have declined. We give below the closing quotations of active stocks.

The bank return shows an increase of \$508,825 in surplus reserve, which now stands at \$10,941,200, against \$23,252,025 at this time last year, and \$20,424,925 at the corresponding period in 1877. The loans show an increase this week of \$5,869,400; the specie is augmented \$81,900; the legal tenders are up \$1,757,300; the deposits other than United States are increased \$5,321,500, and the circulation is up \$33,000.

The following is an analysis of the bank totals of this week compared with that of last week:

	July 5.	July 15.	Comparison.
Loans.....	\$237,950,000	\$243,819,000	\$5,869,000 Inc.
Specie.....	19,889,500	20,000,000	\$110,500 Inc.
Legal tenders.....	49,544,000	51,301,000	\$1,757,000 Inc.
Total reserve.....	197,383,500	204,120,000	\$6,736,500 Inc.
Deposits.....	236,007,300	241,328,800	\$5,321,500 Inc.
Reserve required.....	99,001,845	102,334,000	\$3,332,155 Inc.
Surplus.....	10,432,375	10,786,000	\$353,625 Inc.
Circulation.....	20,544,900	20,577,900	\$33,000 Dec.

The foreign trade movements at the port of New York since our last issue are shown in the following tables:

IMPORTS.			
For the week ended July 12:			
	1877.	1878.	1879.
Dry goods.....	\$1,266,134	\$960,105	\$1,304,836
General mds.....	3,468,261	3,154,941	3,416,557

	1877.	1878.	1879.
Total for week.....	\$4,734,395	\$3,115,046	\$4,721,393
Prev. reported.....	176,594,040	148,722,827	158,599,243

Since Jan. 1.....\$183,335,435 \$154,837,573 \$163,250,636

Included in the imports were items of merchandise valued as follows:

	Quantity.	Value.
Brass goods.....	27	\$2,638
Bismuth.....	9	4,281
Bronzes.....	370	3,700
Chains and anchors.....	6	348
Copper.....	208	2,080
Cutlery.....	63	17,078
Gas fixtures.....	28	4,280
Hardware.....	13	3,158
Iron, pig, tons.....	160	1,797
Iron, sheet, tons.....	39	4,280
Railroad bars.....	45,684	45,684
Iron ore, tons.....	1,300	4,280
Iron, other, tons.....	1,412	37,461
Lead, pigs.....	5,881	5,881
Metal goods.....	21,033	21,033
Old metal.....	5	2,924
Platina.....	1	1,818
Percussion caps.....	65	8,283
Saddlery.....	5	603
Steel.....	2,591	1,597
Silverware.....	3	283
Tin, boxes.....	91,596	91,596
Tin, 2,388 slabs.....	13,172	13,172
Wire.....	1,855	1,855

EXPORTS, EXCLUSIVE OF SPECIE.			
For week ended July 12:			
	1877.	1878.	1879.
For the week.....	\$5,134,417	\$5,413,092	\$5,876,670
Prev. reported.....	138,968,430	177,162,595	193,999,944

Since Jan. 1.....\$144,132,877 \$128,575,688 \$169,778,614

EXPORTS OF SPECIE.			
For the week ended July 12:			
	1877.	1878.	1879.
Total for week.....	\$122,284	\$122,284	\$122,284
Previously reported.....	11,211,716	11,211,716	11,211,716

Total since January 1, 1879.....\$11,334,000

Government bonds were strong throughout, closing at the following quotations:

	Bid.	Asked.
U. S. Currency 6's.....	122	124
U. S. 6's 1880 registered.....	104 1/2	104 3/4
U. S. 6's 1880 coupon.....	104 1/2	104 3/4
U. S. 6's 1881 registered.....	104 1/2	104 3/4
U. S. 6's 1881 coupon.....	104 1/2	104 3/4
U. S. 5's 1881 registered.....	104 1/2	104 3/4
U. S. 5's 1881 coupon.....	104 1/2	104 3/4
U. S. 4's 1881 registered.....	102 1/2	102 3/4
U. S. 4's 1881 coupon.....	102 1/2	102 3/4

The following were the closing quotations of active shares:

	Bid.	Asked.
American Telegraph.....	60	61 1/2
Atlantic and Pacific Telegraph.....	30	31 1/2
Boston Air Line.....	38	39
Canada Southern.....	33	34
Col. Chicago and Indiana Central.....	56	57
Clev. Col. Cin. and Ind.....	58	59
Cleveland and Pittsburgh.....	90 1/2	91 1/2
Chicago and Alton.....	82 1/2	83 1/2
Delaware, Lack. and Western.....	58 1/2	59 1/2
Delaware and Hudson Canal.....	47 1/2	48 1/2

Express-Adams.....	106	106 1/2
" American.....	47 1/2	48 1/2
" United States.....	47 1/2	48 1/2
" Wells, Fargo & Co.....	97	98
Erle.....	27 1/2	28 1/2
Fort Wayne.....	31	31 1/2
Hannibal and St. Joseph.....	20 1/2	20 3/4
Homestead.....	43 1/2	44 1/2
Illinois Central.....	38 1/2	39 1/2
Kansas Pacific.....	57	58 1/2
Kansas and Texas.....	14 1/2	15 1/2
Lake Shore.....	76	77 1/2
Louisville and Nashville.....	58 1/2	59 1/2
Michigan Central.....	78 1/2	79 1/2
Morris and Essex.....	90	90 1/2
New York Central.....	118 1/2	119 1/2
New Jersey Central.....	51 1/2	52 1/2
Northwest.....	69 1/2	70 1/2
" Pref.....	97 1/2	98 1/2
Ohio and Mississippi.....	15 1/2	16 1/2
Pacific Mail.....	40	40 1/2
Panama.....	150	151 1/2
Quicksilver.....	14 1/2	15 1/2
" Preferred.....	37	38 1/2
Rock Island and Pacific.....	30 1/2	31 1/2
St. Louis and Iron Mountain.....	20 1/2	21 1/2
St. Louis Kansas City Northern.....	17 1/2	18 1/2
" Pref.....	47 1/2	48 1/2
St. Louis and San Francisco.....	8 1/2	9 1/2
St. Paul.....	55 1/2	56 1/2
" Pref.....	93 1/2	94 1/2
Standard.....	29 1/2	30 1/2
Sutro Tunnel.....	8 1/2	9 1/2
Union Pacific.....	76	77 1/2
Wabash.....	35 1/2	36 1/2
Western Union Telegraph.....	89 1/2	90 1/2

GENERAL HARDWARE.

Business, owing to the very warm weather prevailing, is lighter this week than last, and few changes in lists or discounts have been made.

In foreign Hardware we hear of a quiet time generally. The price of Armature "Mouse-hole" Anvils has declined two shillings per hundredweight on the other side; they are quoted here at 9 1/2 @ 9 3/4 cents per pound.

Mallory, Wheeler & Co., New Haven, Conn., have issued, under date of 1st inst., a condensed list of Padlocks, containing, in addition to the goods presented in their former list, all the new patterns since added. They also issue an appendix in which their new styles of Padlocks are very handsomely illustrated. Among the goods illustrated are the following, which are shown for the first time:

	1 Key.	2 Keys.
No. 1052, 2 1/2 in. Brass Drop and Bushing, Revolving Key Pin, Flat Steel Key, Self-Locking, Spring Shackle.....	\$3.85	\$3.88
No. 1053, 2 1/2 in. Brass Bushed, Double Chamber, Revolving Key Pin, Double-Bitted Flat Steel Key, Self-Locking, Spring Shackle.....	4.00	4.75
No. 1054, 2 1/2 in. Brass Bushed, Double Chamber, Revolving Key Pin, Double-Bitted Flat Steel Key, Self-Locking, Spring Shackle.....	5.00	5.75
No. 1055, 2 1/2 in. Brass Bushed, Double Chamber, Revolving Key Pin, Double-Bitted Flat Steel Key, Self-Locking, Spring Shackle.....	5.50	6.25

No changes have been made in lists or discounts. They announce that they will soon issue a complete revised list of Door Locks, Knobs, &c., showing reduced prices. Sargent & Co. are their agents in this city.

The manufacturers of Bolts and Nuts at a recent meeting adopted the following revised price lists for Machine Bolts, Bolt Ends, Forged Set Screws and Tap Bolts, Wood or Lag Screws, Skein Screws, Square and Hexagon Nuts and Washers. This list shows a slight advance on the former one, and the classification is considerably changed. Hereafter all Machine Bolts and Lag Screws up to 20 inches in length, will be sold by the hundred instead of by the pound as formerly. The regular discounts to apply to this list are:

	Dis.	Cent.
Machine Bolts.....	70	
Bolt Ends.....	70	
Forged Set Screws and Tap Bolts.....	70	
Wood or Lag Screws.....	70	
Skein Screws.....	70	
Square and Hexagon Nuts, 1/2 off list.....	70	
Washers, 1/2 off list.....	70	

Manufacturers' Standard List of Machine Bolts, with Square Heads and Nuts, Finished Points.

Price per 100.									
L'th.	1/2	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
1 1/2.....	3.80	3.20	3.60	4.60	5.00	7.00	10.00	14.00	22.00
2.....	2.90	3.35	3.80	4.80	5.20	7.20	11.00	15.00	23.00
3.....	2.50	3.00	3.40	4.40	4.80	6.80	10.00	14.00	22.00
4.....	2.10	2.60	3.00	4.00	4.40	6.40	9.60	13.60	21.60
5.....	1.70	2.20	2.60	3.60	4.00	6.00	9.20	13.20	21.20
6.....	1.30	1.80	2.20	3.20	3.60	5.60	8.80	12.80	20.80
7.....	1.10	1.60	2.00	3.00	3.40	5.40	8.60	12.60	20.60
8.....	1.00	1.50	1.90	2.90	3.30	5.30	8.50	12.50	20.50
9.....	.90	1.40	1.80	2.80	3.20	5.20	8.40	12.40	20.40
10.....	.80	1.30	1.70	2.70	3.10	5.10	8.30	12.30	20.30
11.....	.70	1.20	1.60	2.60	3.00	5.00	8.20	12.20	20.20
12.....	.60	1.10	1.50	2.50	2.90	4.90	8.10	12.10	20.10
13.....	.50	1.00	1.40	2.40	2.80	4.80	8.00	12.00	20.00
14.....	.40	.90	1.30	2.30	2.70	4.70	7.90	11.90	19.90
15.....	.30	.80	1.20	2.20	2.60	4.60	7.80	11.80	19.80
16.....	.20	.70	1.10	2.10	2.50	4.50	7.70	11.70	19.70
17.....	.10	.60	1.00	2.00	2.40	4.40	7.60	11.60	19.60
18.....	.00	.50	.90	1.90	2.30	4.30	7.50	11.50	19.50
19.....	.00	.40	.80	1.80	2.20	4.20	7.40	11.40	19.40
20.....	.00	.30	.70	1.70	2.10	4.10	7.30	11.30	19.30

Bolts with Hexagon Heads or Hexagon Nuts, 10 per cent. extra.

If both Hexagon Heads and Hexagon Nuts, 20 per cent. extra.

Manufacturers' Standard List of Bolt Ends, with Square Nuts.

Price per pound.									
Size of iron.....	1/2	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
Length.....	6	7	8	9	10	11	12	13	14

Size of iron..... 1/2 3/4 7/8 1 1 1/8 1 1/4 1 1/2 1 3/4 2

Length..... 6 7 8 9 10 11 12 13 14

Price per lb. 28 29 30 31 32 33 34 35 36 37

Manufacturers' Standard List of Forged Set Screws and Tap Bolts.

Price per 100.									
Length.....	1/2	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2
1 1/2.....	3.80	3.20	3.60	4.60	5.00	7.00	10.00	14.00	22.00
2.....	2.90	3.35	3.80	4.80	5.20	7.20	11.00	15.00	23.00
3.....	2.50	3.00	3.40	4.40	4.80	6.80	10.00	14.00	22.00
4.....	2.10	2.60	3.00	4.00	4.40	6.40	9.60	13.60	21.60
5.....	1.70	2.20	2.60	3.60	4.00	6.00	9.20	13.20	21.20
6.....	1.30	1.80	2.20	3.20	3.60	5.60	8.80	12.80	20.80
7.....	1.10	1.60	2.00	3.00	3.40	5.40	8.60	12.60	20.60
8.....	1.00	1.50	1.90	2.90	3.30	5.30	8.50	12.50	20.50
9.....	.90	1.40	1.80	2.80	3.20	5.20	8.40	12.40	20.40
10.....	.80	1.30	1.70	2.70	3.10	5.10	8.30	12.30	20.30
11.....	.70	1.20	1.60	2.60	3.00	5.00	8.20	12.20	20.20
12.....	.60	1.10	1.50	2.50	2.90	4.90	8.10	12.10	20.10
13.....	.50	1.00	1.40	2.40	2.80	4.80	8.00	12.00	20.00
14.....	.40	.90	1.30	2.30	2.70	4.70	7.90	11.90	19.90
15.....	.30	.80	1.20	2.20	2.60	4.60	7.80	11.80	19.80
16.....	.20	.70	1.10	2.10	2.50	4.50	7.70	11.70	19.70
17.....	.10	.60	1.00	2.00	2.40	4.40	7.60	11.60	19.60
18.....	.00	.50	.90	1.90	2.30	4.30	7.50	11.50	19.50
19.....	.00	.40	.80	1.80	2.20	4.20	7.40	11.40	19.40
20.....	.00	.30	.70	1.70	2.10	4.10	7.30	11.30	19.30

Manufacturers' Standard List of Wood or Lag Screws, with Square Heads.

Length.	5-16	¾	7-16	¾	9-16	¾	¾	¾	1
1½	2.70	3.10	3.50	4.50	4.90	6.90	10.00	14.00	22.00
2	2.00	2.40	2.80	3.80	4.20	6.20	9.30	13.30	21.30
2½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
3	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
3½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
4	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
4½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
5	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
5½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
6	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
6½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
7	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
7½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
8	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
8½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
9	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
9½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
10	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
10½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
11	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
11½	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60
12	1.30	1.70	2.10	3.10	3.50	5.50	8.60	12.60	20.60

of orders, prices are receding slowly. Business could be done in ordinary cokes at 15/-; if not 14/9, though some makers ask 15/6, or even more. Prices for charcoal are also very irregular, no doubt a good deal owing to the increased use of "steel bars," and the consequent introduction of many new brands. Champagne terms we quote : 14 x 20, 17/6; 28 x 20, 36/, for grade of Allaway, STP, &c.

Iron is again the turn in makers' favor, and tin, too, slightly.

FOREIGN.

FRANCE.

(Monteur des Interets Materiels.)

PARIIS, June 29, 1879.—*Metals.*—Business during the week has been moderately active ; a better feeling is perceptible. Copper.—There has been a rise in it, .25 franc above last Monday's price of 1.50 in Best Selected English. We quote Chili Bars, 146.25 @ 150; Ingots and Slabs, 152.50; Best Selected, 156.50, and Best Corocoro o/e 155. Havre is nominal at 143.75 @ 147.50 francs for Chili Bars. Marseilles is at a decline of .75 francs over London. Copper Bolts. They quote small Refined Ingot, 160 francs; Sheet Copper, 175; Bolts, 284; Yellow Metal Sheathing, 190; Copper ditto, 185. Tin in America, 31 francs; in Britain, 28. In Banca Tin, 3 francs in Bilton ditto, 2.50 in Straits and 3.25 in Australian. We quote as follows: Banca, 179; Billiton, 187; Straits, 177.50; Australia, 190; Java and England, 175. At Marseilles, English Tin has dropped 5 francs. They quote Banca, 175; Straits, 175; French and English, 180 francs, the 100 kilos. Lead.—This metal continues neglected, and there is a fresh decline of 50¢. We quote here the various sorts, 34 @ 35. And Manufactured, 40 francs. Havre is steady at 35.50 @ 36 francs for first fusion soft Spanish. At Marseilles, Lead is quiet and inactive with a decline of 50¢ in argentine, 35 @ 36 francs, and in white lead, 34 @ 35. Sulfuric acid, 35.50 @ 34; first fusion soft, 32.50; second fusion, 32; Antimonious, 32; Sheet and Pipe, 37, and Shot, 38. Spelter has relaxed into a quiet position, 37 @ 38 francs. Zinc.—We quote Silesian, 37 @ 37.50 at Havre, and 38.50 at Marseilles able here; Sheet Zinc, 60 francs. Havre quotes Silesian, 38.50 @ 39 francs. Marseilles reports 38.50 @ 39 francs. Sheet Zinc is being quoted there at 57 @ 58 francs, and old zinc melted, 25. Iron.—Larger consumers have been trying their best to avoid subscribing to enhanced pretensions of producers, but the firmness of the latter has won unshaken, they have had to submit to them. Some makers in the Champagne are trying to create a syndicate of all French forges for five years to come. Although the North is doing well, the South, especially in the Haute-Marne, the Haute-Marne still sells the same at 16. Common Nails are neglected in the Haute-Marne at 26 francs for No. 18; polished nails, 28 francs. The market for iron in the North has been sold lower there than elsewhere, owing to compete with the Ardennes. In the Champagne Machine Horse Shoes are to be made in the future. A crisis is said to exist in the North, especially in Flooding iron, at France, where business has lately there have been raised 6 to 10 per cent., bringing them back to the top rates previous to 1873. A raising of prices is contemplated, so far as Axles, Chains, Hoops, &c., and progress is attending the Rhone and Loire the commands for the navy continue. The next lot wanted will be 300 tons Steel in sheets. A firm tone prevails and prices are upheld, but great success is attending the subscriptions to the new society being organized.

dened, considering that the company is to operate in a country so distant from France. *Coal.*—The demand at the North and the Pas de Calais is slack, and the accompanying low prices are accepted. Households buy little *coal*. People hope to do better by deferring purchases till early fall, and the sugar refineries have laid in a sufficient supply to last them for a good many months to come.

BELGIUM
(*Revue Universelle.*)

BRUSSELS, June 29, 1879.—*Iron.*—Although some of our iron works have a good run of orders, the market is not so favorable as it was some time back. The principal concerns have got work on hand to last them for two or three months, but that the majority of rolling mills eagerly take orders to the right and left without becoming particular about the low prices to be submitted to. The market for *iron* that prices remain low and irregular, indicating no tendency in either direction. The Grand Central Belgian Railroad Company have just decided to order 10,000 of the same class of engines for the government lines. The Thy-le-Chateau Company have received this order. We perceive that our neighbors, the Germans, are creating syndicates in all sorts of directions, and are determined to put an end to ruinous competition at home. Thus the German locomotive builders have formed a syndicate which is to take charge of orders and distribute them by turns among them. We unite the attention of Belgian producers to this tendency in Germany, and leave them to decide whether something of the kind may not be attempted among us. *Coal.*

normal in extent. The iron branch operates with a great deal of regularity. The Coal companies keep a check on production, and the iron can and does thus prevent an accumulation of stock. Prices show no improving tendency.

NEWSMAN.
(Borsenhalle.)

HAMBURG, June 30, 1879.—*Metals*—There is a marked tendency to get up radically among producers in this country, under the new system of duties and taxes inaugurated, the arrangements being fortified by heavy penalties and amounts deposited to secure the production of the good that is expected of them. *Copper*—Dealings have been on but a moderate scale, but prices have suffered no powerful decline, although they are in favor of pushing up anything. We quote as heretofore, *Spelter* Berlin quiet.

can be reported from the 17th-18th. No change whatever in the value of the *Leud* is to be seen. It is only that the Banca 71 at 71.50 marks the 50 kilos., and English £6 at 67.50. *Leud*.—The German markets are inactive, and we are unaltered here. Berlin quotes Tarnowitz, Hartz and Saxony Breslau 15.33 marks the 50 kilo. *Spelter*.—Our markets are about as usual, inasmuch as they would be. We have no change to advise from there, while Berlin quotes Silesian, nominally, 15 at 15.50 marks the 50 kilos. There is no quotation from Saxony Breslau, no figures having been transacted to base any business on.

TOLLAND.
(Kreger, Jr. & Co.)

ROTTERDAM, June 30, 1879. (Fin.). Notwithstanding a satisfactory condition of the market, the

present state must be chiefly disappointing to those holders who have based their operations on the expectation of a ready supply. The contrary being the case, and with little prospect of a change, some disposition to sell out has of late been manifested, and the market closes very dull in consequence. —There was a good demand at the beginning of the month, and 39.75 guilders the 50 kilos, was offered, but the market was not more offering the price has since declined to 38.75. —The market for contracts for delivery ex. July sale changed hands from 40 to 39 1/2. Biffon has been in moderate demand, and the market has been a few days, with some pressure to sell, the price has given way to 38.25, and we close with sellers. —The following is an official statement the production of Biffon for the last year, 1874-75, 13,946 piculs, against 11,794 in 1873-74; 59,532 in 1876-77; 62,000 in 1875-76, and 63,000 in 1874-75. The above statement shows a considerable increase, a stock of unsettled ore having accumulated during the previous years, and from which the year closed 1874-75, has been realized the benefit. No complaint is made of the present season, and there has also

been a total absence of other unfavorable circumstances which usually affect mining operations. The import of Banca Tin during the first six months of the year has been 84,336 slabs, against 50,724 last year; the deliveries were 66,532, against 50,724; the stock on hand is 95,212, against 56,611; the import of Biliton Tin has been 57,755, against 55,245; the deliveries were 47,759, against 45,624, and the stock is 63,649, against 51,127. There are about 6800 piculs Banca Tin, against 8400 in 1878, and 21,000 piculs Biliton against 18,000. The government returns of the export of Tin from Holland for the month of April are as follows:

To	April 1879.	April 1878.	April 1877.
Germany	528	318	1,005
England	6	47	152
Belgium	150	137	504
France	48	35	103
Hamburg	48	30	105
United States	20	20	55
Other countries	1	28	33
Total	910	688	1,952

EAST INDIES.

(Dummler & Co.)
BATAVIA (Java), May 8, 1879.—Metals.—Owing to an improvement in the consumptive demand the general position of imports is somewhat better, but no advance in sympathy with home rates could yet be obtained. If the rice crops do not fall short of anticipations, and if supplies of all kinds of goods continue moderate, an improved state of things may be expected for the next season, but it is to be hoped that arrivals will not be such as effectually to prevent any decided rise in rates. Stocks of Swedish Iron Bars have been nearly cleared, and the demand remains fair; all other iron is quiet, especially of galvanized corrugated, of which a good deal is on the way, while local stocks remain large. There is nothing doing in steel. Sales of Copper are trifling. There is no inquiry for Lead. In Sheet Zinc some business is being done. Spelter is neglected. Iron nails are ill sustained. Copper nails are inactive. Tin.—The next sale of Biliton Tin will come off June 9, and will comprise 12,000 piculs. Exchange on London, 11.95 @ 11.97½ guilders per £, six months' credit.

(Rautenberg, Schmidt & Co.)
SINGAPORE, May 13, 1879.—Tin.—The market has been quiet; early in the fortnight 6 tons were bought at \$1.07½ @ \$1.08 per picul, the bulk of which was done at the lower rate; latterly 35 tons changed hands at \$1.07 @ \$1.08 per picul. Coal.—Arrivals aggregate 4000 tons Cardiff, all come to consumers. The market is firm, with little on the way; Cardiff, \$1.12½.

American Horse Nail Machinery in England.—The British Mercantile Gazette has the following: There can be no two opinions as to the influence American ingenuity is effecting on many of the industries of the old country. The latest instance which has come to our notice is in connection with horse-nail making. We are informed that the Stirling Company, near Dawley, having been newly formed, is now adding this branch to its other work. It has purchased machines of the type which is being worked by the Sheridan Horse Nail Company, of Cleveland, Ohio, and Henry B. Sheridan, the patentee of the machinery, and the president of the Cleveland concern, is now at Dawley starting the machines, which at present are served by a States operative, who will train the Shropshire hands.

Overproduction in the Oil Regions.—A dispatch from Bradford, Pa., to the Philadelphia Public Ledger gives a gloomy picture of the state of the oil trade in that region. It is said that the tankage is about exhausted, and 7000 barrels of crude petroleum are poured on the ground daily for want of storage. At the urgent request of the producers the Standard Oil Co. has begun buying oil for immediate shipment at five cents per barrel below the regular prices in the oil exchange.

The venerable Peter Cooper has given the public his views on rapid transit, but has not thereby added to his reputation as an engineer, though nothing he is likely to do or say during the remainder of his useful life is likely to be unfavorably criticised by a generous public, which loves him for his good heart and his wise benefactions. To obviate the annoyances attendant on the present system of elevated railroads, he advocates the adoption of a plan of which the important feature is the use of an endless chain. After considering the advantages of this method of propelling the cars, he recommends a plan for the noiseless running of the cars over the rails. The constant pounding of the wheels in passing from one rail to another is to be avoided by the use of a chair which will give support to the wheel. The wheels themselves are to be made with a groove over the whole face, which is filled with hard gutta percha. "An elevated railroad so constructed," Mr. Cooper says, "with the propelling power under ground, and the rails so arranged as to take up the momentum in stopping and hold it ready to be given out in starting, with the wheels of the cars covered with gutta percha working on a gutta percha covering, and the rail held in a firm grasp in an india rubber chair, so that it would not touch iron in any of its parts, would have nothing to convey sound except the mere rubbing of the flange against the side of the rail. This rubbing could be avoided mainly by the shape of the flange."

The Wabash and the St. Louis, Kansas City and Northern railroads are to be united under the name of the Wabash, St. Louis and Pacific Railroad. The largest shareholders of both companies have given their consent to the consolidation. The union of the two companies, which lacks only the formal ratification by their stockholders, has been virtually accomplished. The capital stock of the new corporation has been fixed at \$40,000,000, the sum of the combined stocks of the two companies. Of this capital one-half will be preferred and the other half common stock. The present capital of the St. Louis, Kansas City and Northern road is \$24,000,000, divided equally into preferred and common stock. That of the Wabash is \$16,000,000 of common stock. There will be no change, therefore, in the stock of the St. Louis road, but the capital of the Wabash road will be divided equally into preferred and common stock. The funded debts of the two companies will remain for the present unchanged. It is probable that on the completion of the proposed extensions on the part of the Wabash to Chicago and Detroit, and on that of the St. Louis road to Omaha, the sectional mortgages will be consolidated and secured on the entire line of road. The bonded debt of the new company will be then at the rate of about \$22,000,000 a mile. With the present mileage the funded debts of the two companies amount to about \$25,000,000 a mile.

INDUSTRIAL ITEMS.

MASSACHUSETTS.

The petition to place the Lenox Iron Company in insolvency has been dismissed, settlement with the creditors having been made, and the title goes to the Smith Paper Company.

NEW YORK.

The Troy Standard says: Work will be resumed in Filley's foundry, Green Island, August 1. The foundry of G. H. Phillips & Co. has just shut down for five or six weeks. The reconstructions at the Clinton foundry have been completed. Work has been resumed with a full force of men. The capacity of the Elmira Rolling Mills is to be doubled, and the company are to engage in the manufacture of bridges.

The Wood Mowing and Reaping Machine Company, of Hoosick Falls, manufactured 2715 machines during the month of June.

Witherbee, Sherman & Co. are constructing hoisting apparatus preparatory to sinking a new shaft at their mines at Mineville. The Carthage Furnace was to resume operations on Thursday last, the 10th inst.

PENNSYLVANIA.

The Greenville Iron Company are getting ready to manufacture iron cottons. They propose making 1000 tons as an experiment, and if they can do so profitably, they will accept a contract offered them by a Southern firm for 5000 tons. Hamblin, Sons & Co., of this place, are making the necessary changes in the mill—Aryus.

Miller & Co., of Reading, have received the contract for furnishing water pipe for Lancaster City from now until next April, at the following prices: 4-inch pipe, not delivered, \$21.40; 6, 8, 10 and 12-inch, delivered, \$21 per ton; 4-inch, delivered at Lancaster, \$22.76; 6, 8, 10 and 12-inch, delivered, \$22.46; for special casting, 1, 9 and 10 cents per pound.

The Mount Carbon Rolling Mill, at Pottsville, which originally cost the owners \$250,000, and which was recently destroyed by fire, was sold at auction on Wednesday afternoon by the company which operated it. The machinery and scrap were bought by Lippincott & Co., of Philadelphia, for \$5475, and the real estate by Vanwickie & Stout, of New York, for \$1000.

The Board of Managers of the new company growing out of the reorganization of the old Lehigh Valley Iron Company, have completed their organization. The name of the new company is the Coplay Iron Company, Limited. E. F. Wilbur was chosen president, William H. Ainey, secretary and treasurer, and V. W. Weaver, superintendent. It is proposed to begin work as soon as the necessary preparations can be completed; and, as the company starts out with no debts except those owing to the members, the career of the new company must be successful.

All the iron works in Reading are very busy and working to their full capacity. The outlook is of the most cheerful character. The Reading Iron Company is working steadily, and there are large orders ahead of the most encouraging character. The industrial outlook among the furnace men is very cheering, and there are indications that prices for pig iron will stiffen in the near future. The 10-hour working time still exists in all the P. & R. departments, and coal shipments are on the increase. The coal strike in the Shamokin regions does not materially affect the Reading Company's output. All manufacturing industries are in fair operation, and the freight department of the Reading Company is running fairly full.—Reading Eagle.

The Pine Iron Works are now running regularly, and to their full capacity, for the first time since the panic of 1873.

The Ormsby Furnace, Sharpsville, after undergoing repairs for the past two months, was put into blast on Saturday evening, and everything appears to be working in good order. The company operating it is styled the Perkins Iron Company, Limited, with S. Perkins, Jr., of Sharon, as manager. This makes four furnaces now in blast at Sharpsville, and three of the remaining five are being fitted up preparatory to blowing in.

There is no truth in the report that the Philadelphia and Reading Coal and Iron Co. were about to lease the iron works of Shoener & Allen, at Tamaqua.

"Tubal Cain," in the Sharon Herald of the 11th inst., says: In Lawrence County, at New Castle, we have four blast furnaces in blast and three out of blast; two rolling mills in operation and one idle. The Wampum Furnace is still idle, with no prospect of an early start. The mills in operation in New Castle are the Etna (Kimberly, Carnes & Co.) and the sheet mill (Bradley, Reis & Co.). As a total we have at the close of the first half of 1879, 11 blast furnaces in and 19 out in the Shenango Valley—36½ per cent. on a unit of 30. Of the furnaces, No. 2, at Wheatland, would be abandoned, and the "Pet," at New Castle, might be put in the same list, because both stacks are too small to be taken into account these days. Of rolling mills we have a total of six in operation and three out—that is, 66 per cent. on a unit of 9—running 100 boiling and 29 heating furnaces, working double turn. The Perkins Furnace, in Sharpsville, was blown in Saturday, June 28. The stack is 12 feet in diameter of boshes, open top and closed front. It is the intention to make a specialty of Bessemer pig iron.

PITTSBURGH AND VICINITY.

The piston of one of the Lowry engines at the new water works came out of the piston head last week, and the engines were consequently stopped for a day or two. Mechanical Engineer Lowry says shrinkage cracks were discovered in the piston head. J. B. Young & Co. are so busy that they have taken on a number of new molders, and are running day and night. They report new orders are coming in by every mail, and that they will have to work double turn for some time yet.

The largest chill roll ever cast in this country, if not in the world, was cast last week at the foundry of A. Garrison & Co. Its dimensions are as follows: Diameter of body, 31 inches; length of body, 112 inches; diameter of journals, 20 inches; diameter of couplings, 18 inches; total length, 12 feet

1 inch. Sixteen tons of metal were required to pour it. On examination the roll was found to be perfect in every respect. Another roll of the same dimensions will be cast shortly, and also a roll 20 inches in diameter to run between the large pair, the stand being for a Lauth 3-high. They are intended to be used for rolling homogeneous steel plate.

H. K. Porter's locomotive works, Lawrenceville, have been very busy of late.

Graff, Bennett & Co.'s iron mill, at Millvale borough, is running in every department, employing a force of about 550 men. The special work of the mill is pipe iron.

The Crescent Steel Works have the usual amount of work on hand, which keeps their full force of workmen employed.

James Thorn & Co. had a contract for building an iron boat for an English company that has a line of boats on the Magdalena River, U. S. Colombia; but the war now in progress in that country has so disarranged affairs that the contract is "off"—at least for the present. Nevertheless, there is a prospect that there will be some iron boat building done here this summer.

The work of erecting the new glass factory for Atterbury & Bro., near the Pan Handle Railroad bridge, on the South Side, will be commenced at once. The new works are to be completed by January 1, 1880, at which time the 20-year lease of the present site expires.

WEST VIRGINIA.

The Moundsville Mill is closed for repairs. The Riverside was to resume Tuesday, and run until the 1st of August. It is stated they will soon stop using old rails, and manufacture nails from muck iron entirely.

At this time a great deal of interest is centered in the Belmont Mill. We cannot publish all we know without violating confidence, but the public may rest assured that the outlook is very favorable. Plans for the successful and continued working of the mill are being matured, with which uninterested parties will not be allowed to interfere, and at the proper time, which will be at no distant day, the Belmont will start on a new as well as a more substantial basis than has been heretofore in all her previous history.—Wheeling News Letter.

OHIO.

Taylor & Boggis, Cleveland, received on the 14th inst., from Zurich, Switzerland, an order for 10,500 pounds of light castings. This order was secured in competition with foreign bidders, and perhaps with bidders from this country, although we do not know of any other bid sent from the United States. The price is fairly remunerative, and the securing of the order quite a little victory for an American house.

The Ogden blast furnace and lands, in the Hocking Valley, were sold at assignee's sale last week to John R. Buchtel, Akron, and Col. W. D. Hamilton & Brother, of Chicago, for \$25,000. The furnace was erected two years ago and cost, with lands attached, \$100,000. The furnace was blown out six months after completion, and has been lying idle ever since. It is stated that the new company will start the furnace in a few weeks.

The roof of the stock house of the Himrod Furnace Company, at Youngstown, fell in on the morning of the 11th. Loss, \$6000. Five men were injured.

The Brown, Bonnell & Co. trouble has broken out again. Directors are to be elected on the 17th inst., and it has been discovered that 500 shares of stock have been transferred on the books from the name of Richard Brown to that of James L. Botsford. If these shares are voted by Mr. Botsford, or if they are not voted by any one, the Bonnell party will be able to elect a board. Hence the excitement.

A patent has recently been granted a glassblower of Steubenville for improvements in glass molds. The improvement consists of the combination, with a mold for making articles of glass of one or more adjustable cutters, which operate to mark or score the glass article being formed in the mold at the precise line of separation required for the final operation of severing the articles of uniform size, besides effecting a great saving of labor.

The Sarah Furnace, Ironton, has stopped for the want of coke, the river being so low that no supplies can be brought down from Huntington.

The Garry Iron Roofing Co., Cleveland, have received a contract for roofing the United States government printing department building in Washington, D. C.

It is stated that the old rail mill, Youngstown, will be changed into a bar and guide mill soon.

ILLINOIS.

A trust deed from the Joliet Iron and Steel Company to the Central Trust Company of New York, has been filed for record in Wills County to secure its first mortgage bonds, aggregating \$458,000 of \$100 each, bearing 7 per cent. interest and maturing in ten years from date. It is reported that these mills will soon resume the manufacture of railroad spikes, and will furnish employment to a large number of hands.

The Continental Bolt Works, of Chicago, are having a brisk business.

The Chicago Nickel Works Company have just completed their new factory.

KENTUCKY.

The Cottage Furnace, at Mount Sterling, is preparing to go in blast.

The Big Sandy Railroad, in this State, is about to be completed to westward connections from Chesapeake and Ohio Railroad, at Huntington, Va. It will then run through Castigan, Lexington and Louisville, and will pass Bath and Carter furnaces and near others in Eastern Kentucky, and will put new life in them.

The Princess Furnace, lands and improvements will be sold at public outcry on the 28th.

The Iron Hills Furnace is now averaging 11½ tons of strictly No. 1 pig iron.

MICHIGAN.

The following from the Marquette Mining Journal, is a statement of ore and pig iron shipments by lake, from Lake Superior, for the season of 1879, up to and including Wednesday, July 2:

MARQUETTE.		Gross tons.
Mine.		
McComber	2,606	
Manganese	1,927	
Rolling Mill	359	
Cleveland	22,922	
Lake Superior	27,767	
Winthrop	4,430	
Humbolt	4,373	
Edwards	3,398	
Republic	36,593	
Champion	24,833	
Marquette	301	
Total ore	129,396	
PIG IRON.		
Carp Furnace	2,178	
Pioneer Furnace	868	
Total pig iron	2,986	
QUARTZ.		
Carp River Iron Co.	1,285	
L'ANSE.		
Michigamme	10,779	
Spurr	408	
Total	11,187	
Ore to local points	13,123	
Total ore, pig iron and quartz	157,820	
ESCANABA.		
Angeline, Specular	6,475	
Angeline, Hematite	978	
Barnum	9,302	
Bessemer	3,228	
Cambria	1,910	
Cheshire	4,265	
Cleveland	6,003	
Cleveland Hematite	3,834	
Cyclops	5,147	
Edwards	303	
Essex	2,855	
Goodrich	1,837	
Jackson	21,336	
S. Jackson	7,184	
McComber	2,849	
Michigamme	2,445	
Mitchell	3,327	
National	10,116	
New York	20,648	
Cheshire	9,659	
Palmer	6,975	
Quinnesee	7,856	
Saginaw	12,374	
Salisbury	11,821	
Superior, Hard	13,488	
Superior, Hematite	280	
Vulcan	4,743	
Winthrop	1,327	
Section 12	1,985	
Foster	644	
Total	194,507	

The new owners of the Green Bay furnace are engaged in putting the kilns in repair, and propose to have the furnace ready to go into blast some time in August.

METALLURGICAL NOTES.

PHOSPHORUS IN COAL.

Mr. C. Henry Roney, C. E., has contributed to a recent number of the *Journal of the Franklin Institute* a short note, which he entitles, "A Comparison of the Percentages of Phosphorus in Bituminous and Anthracite Coals." He states that, in 1869, he made a series of analyses of Schuylkill anthracite, which satisfied him that most of the leading coals of that district contain scarcely a trace of phosphorus if carefully prepared, picked and screened free from slate, but that they might contain injurious amounts of phosphorus and sulphur when carelessly mined and prepared. He quotes Dr. McCreath's analyses of bituminous coals and coke, and publishes a letter from Dr. C. M. Cresson, of Philadelphia, to Mr. W. E. C. Coxe, in which his view that the slates of anthracite coal are the chief source of the metalloids impurities, is substantiated. Dr. Cresson says: "By reference, I find that the announcement that the slates accompanying anthracites frequently contain phosphorus, as well as sulphur, was made at the meetings of the American Philosophical Society, held May 1st, 1874, and March 5th, 1875. The major part of the phosphorus is in the upper slate, and varying amounts have been got from the dividing and lower slates. I have found that the sulphur is generally distributed and located in a similar manner. A knowledge of these facts enables the selection of anthracite with a minimum both of sulphur and of phosphorus. In fact, the competition for trade has rendered such careful preparation necessary, and there are now mined and sent to market from Schuylkill County, coals practically free from both phosphorus and sulphur. I have recently made analyses of large samples taken from the cars as they were loaded for market, at the Boston Run and Hammond collieries of the Philadelphia and Reading Coal and Iron Company, and find that they do not contain an appreciable amount of phosphorus and of sulphur, but 0.1233 per cent. and 0.0822 per cent., respectively. You will perceive, therefore, that the substitution of coke, either in whole or in part, as suggested for properly prepared coals, will not improve upon the quality of these coals in respect to the elements named."

DEPHOSPHORIZATION OF PIG IRON IN THE BESSEMER CONVERTER.

M. Pourcelet, the accomplished engineer of the Terre Noire Works, recently read before the Société de l'Industrie Minérale, at St. Etienne, France, a paper on the all-absorbing topic of the metallurgical world, the manufacture of good steel from pig high in phosphorus by the Thomas & Gilchrist process. His theoretical developments differ considerably from those of other eminent authorities, and as he does not hesitate to draw from them important practical conclusions, his views will command attention. He asserts, first of all, that the dephosphorization of the metal cannot take place until the carbon is removed. Air must be blown in after the disappearance of the carbon, so that much peroxide of iron is formed and dissolved. The reduction of the latter by the addition of spiegel may give rise to explosions. The dephosphorization commences only after carbonic oxide gas is no longer formed, as it cannot take place in a reducing atmosphere. This is sustained by the fact that no such action occurs in the blast furnace, even though the cinder be exceptionally basic. M. Pourcelet states, also, that in England the steel produced by the new process runs higher in phosphorus after ten per cent. of spiegel-iron has been added, than before such addition. This, he claims, is due to the fact that a portion of the phosphate of iron of the cinder is reduced by the large volume of carbonic oxide gas which is generated in the molten metal as soon as the spiegel is added. It is possible, he says, that the phosphide of iron oxidizes, forms a phosphate of iron, which may combine with the silicates of iron and lime. But under whatever condition the operation may be carried on, and however small the percentage of silica in the cinder may be, the phosphide of iron can only be carried into the slag under the influence of energetic oxidation, and only when carbon is reduced to its minimum. In consequence of this, M. Pourcelet urges, a period of overblowing will always be characteristic of the method in question. It may be predicted that in the Siemens-Martin or Pernoit furnaces, where such a strongly refining action by overblowing cannot be reached, the dephosphorization can never be practically attained, although the basic lining may be the same as that used in the Bessemer converter. M. Pourcelet holds that phosphorus is eliminated in direct proportion with silicon so long as no carbonic oxide is formed, and the operation is carried on under circumstances which prohibit the presence of free silica. The action of lime, he asserts, is only one of preservation, and dephosphorization can only be effected by a very energetic oxidation.

UTILIZATION OF PHOSPHORUS.

Mr. Sidney G. Thomas, one of the inventors of the famous dephosphorizing process, not content with having rendered phosphorus—that dreaded impurity of iron and steel—harmless, has gone one step further and proposes the utilization of the phosphorus which in his process is, as it were, concentrated in the slag. He roasts the cinder obtained in blowing pig with simultaneous additions of lime and oxide of iron, in a reverberatory furnace, in order to convert the protoxides of iron and manganese into insoluble peroxides. After calcination the slag is ground fine, and is treated with cold hydrochloric or sulphuric acid, diluted, or with a cold solution of sulphuric acid, which dissolves the phosphoric acid. With the latter solvent the phosphate will be almost at once precipitated on heating, while the sulphuric acid which is driven off may be recovered by condensation. The solution in hydrochloric or sulphuric acid may be completely evaporated, forming a concentrated product which, when the former acid has been used, contains chloride of lime. These or any other methods practiced for the manufacture of phosphates may be made use of. As few have an idea of the enormous quantities of phosphorus which are annually wasted in the manufacture of iron, it may be interesting to cite the fact that the phosphorus contained in the iron produced in the Cleveland district of England alone amounts to 30,000 tons. Although the recovery of phosphorus is not a novel idea, it is possible that the concentration of phosphoric acid in the slag (7 to 15 per cent.) may render it practically attainable.

The Antwerp Exhibition.—We have received a copy of a circular issued by Mr. Stanislas H. Haïne, of Antwerp, Belgium, giving information concerning the approaching international industrial exhibition at that place. Mr. A. Kaufman, 32 to 36 Park Place, New York, is authorized to accept and forward goods from this country, in the absence of any United States Commissioners, and will forward and return them free of cost, assuming personal responsibility for their sale or safe return. Heavy machinery or large and bulky exhibits will not be accepted on these terms, but all kinds of small articles adapted to the Belgian and neighboring European markets are desired, and can be exhibited with advantage. Mr. Kaufman will take much pleasure in giving such information as those who contemplate becoming exhibitors may desire. It is necessary, however, that immediate action should be taken, as only a short time now remains for forwarding exhibits.

A dispatch from Paris, under date of July 12, contains some rather surprising intelligence, to the effect that an important treaty, affecting the interests of New York, has just been signed in that city. In 1868 the New York Legislature passed an act incorporating the New York City Central Underground Railway. This charter was confirmed and amplified by another act of 1869. In 1870 the company located the line under the charter, and in 1873 the franchise was mortgaged. A foreclosure was entered in 1876, and the title under sale was perfected September, 1876, by Mr. Vandenberg, the purchaser. In December, 1877, an effort was made to interest Sir Edwin Watkins in the work, but without success. The scheme remained in abeyance until July, 1878, when the Banque Parisienne, of Paris, began to investigate the matter. "A final treaty for the supply of the necessary capital for the construction of the road was signed yesterday by the bank, subject to the stipulation that the company shall raise \$500,000 for first expenses and establish the validity of its franchise." This belongs to the class of news which the country papers give their readers, under the cautious heading, "Important, if true." It may be true, for all we know to the contrary, but it is interesting all the same.

Affairs in the Cleveland district, England, are very far from promising. The protracted depression has brought nearly everybody down to the lowest point, and the continued bad trade, together with the effects of the recent strikes in the coal trade, and the heavy failures, has placed many firms in such a position that the least financial disturbance may be followed by serious consequences. Every effort will be made to tide over the next few months, after which it is hoped that trade will improve. With regard to Messrs. Lloyd & Co.'s failure it is not expected that any attempt will be made to keep these works in operation. As to Hopkins, Gilkes & Co.'s concerns, the creditors are sanguine that they will get a handsome dividend. The engine works of this company will not be allowed to stop, and it is hoped when the whole affairs of Hopkins, Gilkes & Co., Limited, are wound up a new company will be formed for the purpose of taking over the splendid site by the river side, and erecting steel works.

Edward Learned has received a grant from the Mexican government to assist in building a railroad 150 miles in length across the Tehuantepec Isthmus.

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This Lawn Stool is made of second growth White Ash, the strongest and most beautiful of our native woods. The seat is heavy cotton sail duck. The frame is put together with bolts and screws, and without glue, so that rain does not injure it. It shuts up more compactly and weighs less than any other 4-post stool in market. While it is much the cheapest, it is equal to the best in use. Dealers in such goods in all places will get them to fill the demand. They weigh two pounds each.

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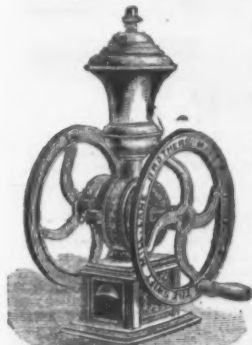
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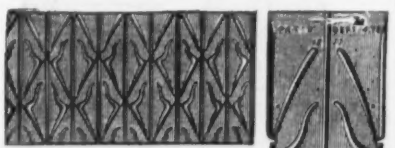
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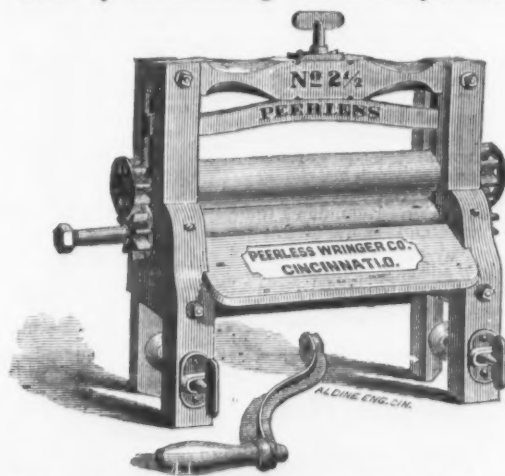
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Cold Rolled Shafting.

We have received the following:

To Whom it May Concern: In view of the circular dated the 5th inst., issued by Messrs. James B. Young & Co., of this city, we consider it due to those interested that we publish the following correspondence between James B. Young & Co. and ourselves, relating to said circular, and also the subjoined extract from the record of the suit in the State Court, showing the decision of the Common Pleas Judge touching our patent No. 7003 (reissue), to which we refer in our letter to Messrs. James B. Young & Co.

JONES & LAUGHLINS.
PITTSBURGH, PA., June 30, 1879.

PITTSBURGH, June 5, 1879.
Messrs. Jones & Laughlins—GENTLEMEN: We propose to issue a circular as follows: To All Whom it May Concern: Notice is hereby given that in the Court of Common Pleas, No. 2, of Allegheny County, Pa., we brought an action against Messrs. Jones & Laughlins for the issuing of their circular dated August 1, 1877, wherein they assert that the use of "Seaman's Rolls" for the purposes therein named is an infringement of Jones & Laughlins' letters patent for cold rolling and polishing iron and steel; which circular we claimed, in said action, to be false and defamatory. Upon the trial of this action the jury found for us, and on this verdict the Court, on June 2, 1879, entered judgment against Jones & Laughlins and in our favor.

The issue of this circular is deemed proper to correct any misapprehension created by Jones & Laughlins' circular, and we trust that this judicial determination of the incorrectness of the latter, will satisfy the public that they can safely purchase and use the "Seaman's Rolls."

If you have any objections, would be pleased to have them now.

Yours, truly, JAMES B. YOUNG & CO.

PITTSBURGH, June 6, 1879.
Messrs. Jas. B. Young & Co., Pittsburgh, Pa.—DEAR SIRS: We are in receipt of your letter of the 5th inst., containing a copy of a circular which you propose to issue, and in which you say, "If you have any objections, would be pleased to have them now."

In our judgment your proposed circular is calculated to mislead. While you therein state that a verdict was rendered in your favor in the suit in the Court of Common Pleas of Allegheny County, Pa., you suppress the fact that that verdict was for the sum of six and one-fourth cents only. Furthermore, your proposed circular does not inform the public that the Judge who tried the case in the Common Pleas Court decided, (as our counsel advises us) that the use of Seaman's Rolls in the manner complained of by us does infringe one of our letters patent, viz.: Reissue No. 7003, dated March 21, 1876, for "Improvement in the manufacture of iron."

We have further to say to you, that the dispute between you and ourselves involves a question of the infringement of our two letters patent, Nos. 7003 and 7004 (reissues both dated March 21, 1876), for cold rolling and polishing iron and steel, and we are advised by our counsel that this question can only be judicially determined by the Courts of the United States, and you well know we have now a suit pending in the United States Circuit Court for the Northern District of Ohio, against the Akron Iron Company, for infringing our two letters patent by the use of "Seaman's Rolls."

In order properly to understand the state of the case, the public should be advised of all the facts above stated.

Very respectfully, yours,
JONES & LAUGHLINS.

The Judge of the Common Pleas Court charged the jury in the case of James B. Young & Co. vs. Jones & Laughlins, in the words following:

"The defendants contend, however, that any rolling of iron or steel by which its hardness, strength or stiffness is increased, at a lower temperature, and after it had been rolled and finished in the usual way, prior to their original patent of August 23, 1859, is a violation of their rights under that patent and reissue 7003, although it may be finished while the metal retains considerable artificial heat. This strikes me as a fair interpretation of that patent, and I so instruct you."

And the Judge affirmed the following points submitted by the defendants (Jones & Laughlins), viz.:

"5. That the defendants' reissued patent No. 7003, contemplates that cold rolling as described in and covered by that patent, may be carried on while the bars have such a degree of artificial heat as they retain immediately after they have been rolled out and shaped in the common way as hot rolling was practiced prior to Lauth's invention. Affirmed."

"7. That the range of temperature for cold rolling iron and steel comprehended by the defendants' patented process extends from the degree of heat at which hot rolling ceased, according to the common method practiced before Lauth's invention, down to an absolutely cold state, and the use of Seaman's Rolls within that range of temperature to impart to iron and steel the improved qualities contemplated and covered by the defendants' reissued patent No. 7003, would be an infringement thereof. Affirmed."

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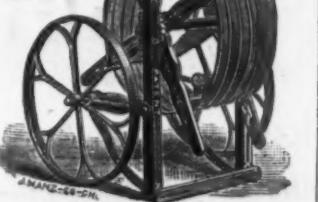
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3d. This Hose Cart is also furnished with a ratchet device to retain the reel as fast as the



hose is wound thereon; besides which it has adjustable rubber clamps to hold the different sizes of hose, and rubber clasp to grasp the nozzle, with other minor improvements, which combine to make it perfect.

Reel A takes 100 ft. 1-in. or 1 1/2-in. Hose.
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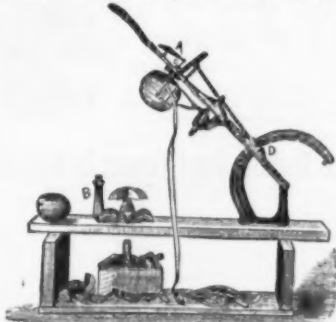
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Divider Combined,

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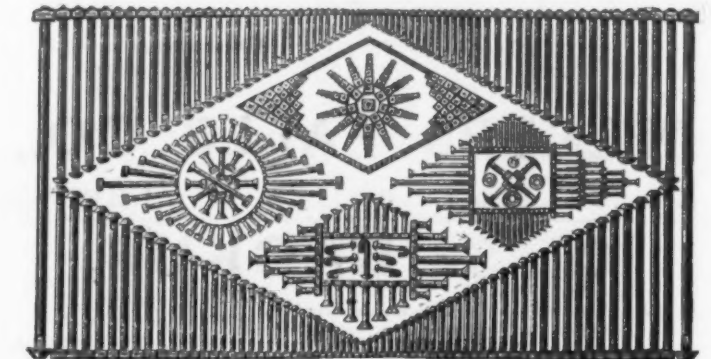
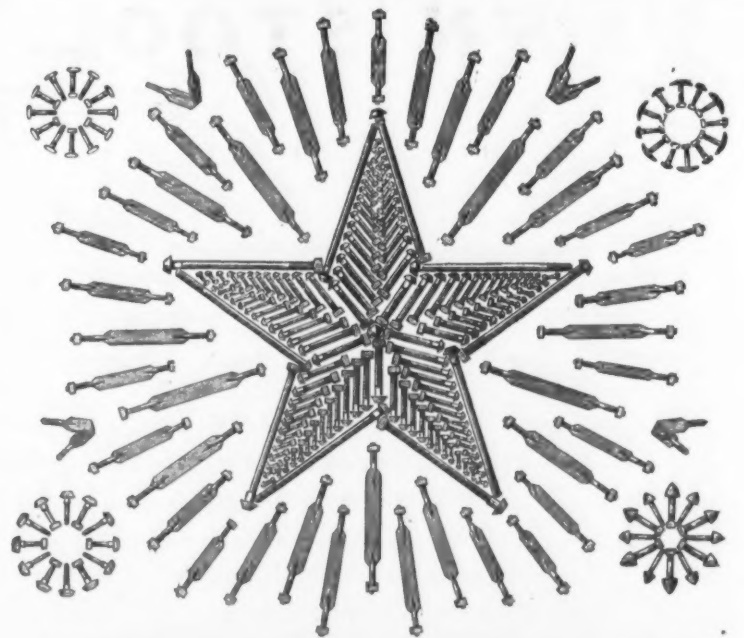
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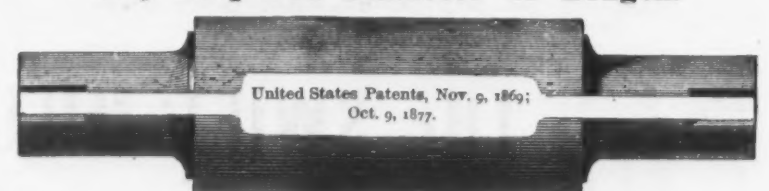
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Van Wagoner & Williams, 81 Beekman, N. Y. 12

Hardware Specialties.
American Machine Co., 502 N. 4th, Phila. 8
Baker Hermann & Co., 101 Duane, N. Y. 29
McCoy & Co., 134 and 136 Duane, N. Y. 29

Harness Snaps.
Covert Mfg. Co., West Troy, N. Y. 35

Hay Rakes.
Holt Hiram & Co., East Wilton, Me. 35

Hinges.
Stanley Works, New Britain, Conn. 8

Hog Ringers.
Chambers, Boring & Quinlan, Decatur, Ill. 12

Holding Engines, Makers of.
Craney Bros., Chicago, Ill. 34
Davis A. J. & Co., Newark, N. J. 93

Holding Machines.
Box Alfred & Co., 312 Green, Phila. 35
Clem & Morse, 111 Cherry, Philadelphia. 35
Harrington Edwin & Son, Philadelphia, Pa. 35

Hollow Chilled Rolls.
Totten & Co., Pittsburgh, Pa. 22

Hollow Ware.
W. F. Wells, 38 Beekman, N. Y. 4

Hooks (Cotton & Bale).
New York Handle & Mallet Works, 455 E. Houston. 13

Horse Clippers.
Boker Hermann & Co., 101 Duane, N. Y. 29

Horse Nails, Makers of.
Ausable Horse Nail Co., 4 Warren, N. Y. 39
Bridgeport Iron Co., Bridgeport, Mass. 6
Nail Co., Cleveland, O. 6
National Horse Nail Co., Vergennes, Vt. 6
Northwestern Horse Nail Co., Chicago, Ill. 6
Horan Horse Nail Co., Philadelphia, Pa. 12

Horse Shoes, Makers of.
Burden Iron Works, Troy, N. Y. 39
Rhode Island Horse Shoe Co., Providence, R. I. 31
Schoenberger & Co., Pittsburgh, Pa. 39

Hose (Linen).
Eureka Fire Hose Co., 13 Barclay, N. Y. 6

Hose Cart.
Mann & Co., Rockford, Ill. 22

Housewarming Goods.
Pierce Geo. N. & Co., Buffalo, N. Y. 22

Hydrants, &c.
McLean John, 30 Monroe, N. Y. 25
Mohaw & Hudson Mfg. Co., Watford, N. Y. 25

Hydraulic Jacks.
Dudgeon Richard, 24 Columbia, N. Y. 9
Lyon E. & Co., 470 Grand, N. Y. 9

Ice Cream Freezers.
Dunne L. E., 23 Dock, Phila. 4
White Mountain Freezer Co., Laconia, N. H. 12

Ice Picks.
Weeks A. & Co., 81 John, N. Y. 32

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Hartford Steam Boiler Inspection & Insurance Co. 35

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Etting Edward J., Philadelphia, Pa. 4
Hartung E. & Co., Pittsburgh, Pa. 4

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Richardson J. O., 232 Dock, Philadelphia. 4

Iron, Pig, Importers of.
Williamson James & Co., 50 Wall, N. Y. 4

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Purman J. Wesley, Philadelphia. 4
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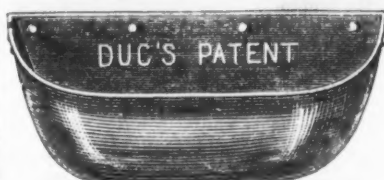
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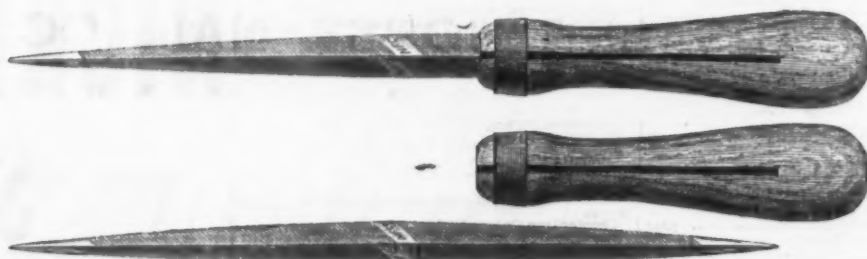
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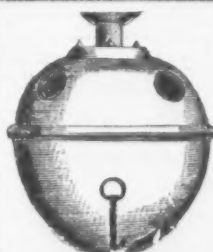
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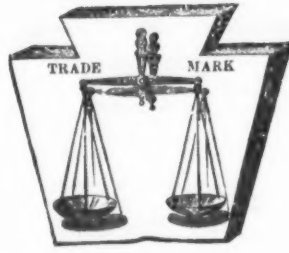
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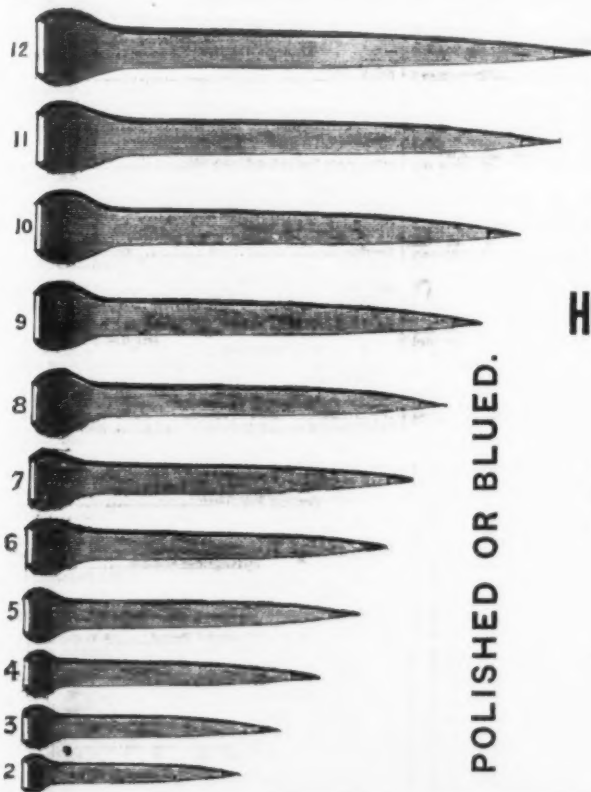
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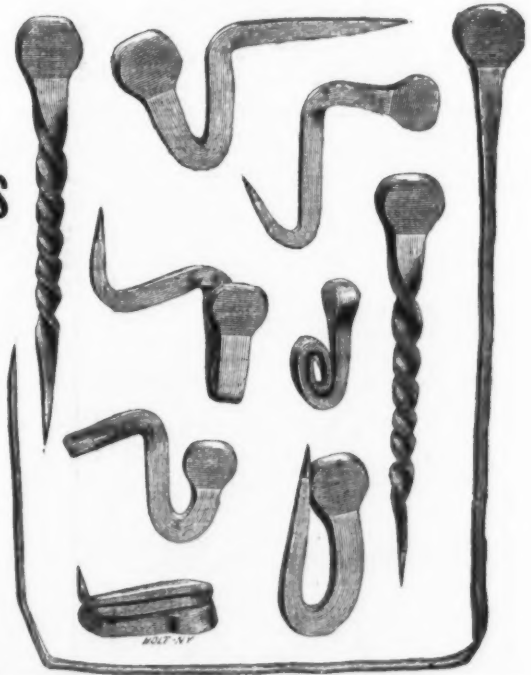
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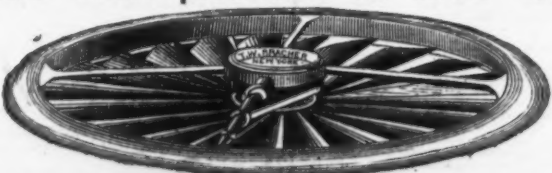
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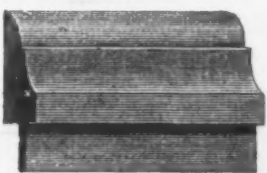
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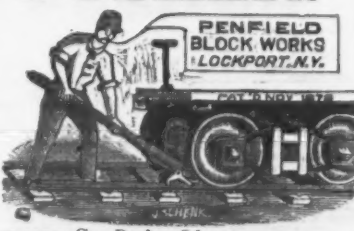
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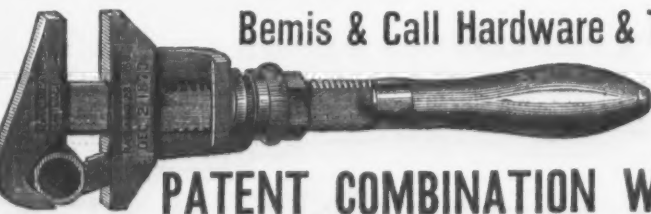
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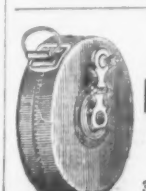
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
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Post Office Address, Pittsburgh, Pa.

Represented at Boston by WETHERELL BROS., 21 Oliver St.; at Milwaukee by JOHN FRITZLAFF, 45 to 49 West
Water St.; at Chicago by S. D. KIMBARK, 80 to 84 Michigan Ave.

ALBANY & RENSSELAER IRON & STEEL CO.,

Troy, N. Y.,

Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

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MERCHANT BARS, TIRE AND SHAFTING.

Railroad Iron, Pig Iron, Merchant and Ship Iron.

AGENCIES IN BOSTON AND PHILADELPHIA.

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GAUTIER STEEL CO., LIMITED,

STEEL,

WIRE and SPRINGS.



WORKS.

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Eastern Warehouse, 93 John St., N. Y.; Phila. Warehouse, 515 Commerce St.

FRANCIS HOBSON & SON,

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Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

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S. & C. WARDLOW,

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Manufacturers of the Celebrated

Cast and Double Shear
STEEL.

In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table Knives,
Mining Tools, Dies, Files, Clock and other Springs, and Tools of every variety.

Warehouse, 95 John Street, New York.

WILLIAM BROWN, Representative.

FOREST CITY STEEL CO.,

Manufacturers of Best Quality

Crucible Steel for Drills, Taps, Dies, Tools, Mill Picks, &c.

Testimonial of D. J. Jones, Roll Turner, Cleveland Rolling Mill Co.

"I have been testing the steel on chilled iron rolls along with the best English and American steels,
and find it superior to any of them in every respect."

Samples furnished for trial. Quality guaranteed equal to any.

No. 13 Detroit Street, Cleveland, Ohio.

Steel.

R. MUSHET'S
Special Steel

FOR

LATHES, PLANERS, &c.

Turns out at least double work by increased speed
and feed, and cuts harder metals than any other
Steel. Neither hardening nor tempering required.

Sole Makers

SAMUEL OSBORN & CO.,
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STEELINE.



Used for refining and temper-
ing all kinds of Steel Tools.
Increases their durability at
least fivefold.

Secures absolute safety from
cracking.

Send for circular to

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Gunpowder.

GUNPOWDER.

DUPONT'S

Rifle, Sporting and Blasting Powder

The most popular Powder in use.

Dupont's Gunpowder Mills, established
in 1801, have maintained their great reputation
for 78 years. Manufacture the following cele-
brated brands of Powder:

DUPONT'S DIAMOND GRAIN,

Nos. 1 (coarse) to 4 (fine), unequalled in strength, quick-
ness and cleanliness; adapted for Glass Ball and
Pigeon Shooting.

DUPONT'S EAGLE DUCKING,

Nos. 1 (coarse) to 3 (fine), burning slowly, strong and
clean; great penetration; adapted for Glass Ball,
Pigeon, Duck and other shooting.

DUPONT'S EAGLE RIFLE,

A quick, strong, clean Powder of very fine grain for
Pistol shooting.

DUPONT'S RIFLE, Fg. "Sea Shooting,"
Fg and FFG.—The Fg for long range rifle shoot-
ing, the FFG and FFG for general use, burning
strong and moist.

Also all kinds of Sporting, Mining, Shipping and
Blasting Powders of all sizes and descriptions. Special
grades for export. Also, Musket, Cannon, Mortar
and Mammoth Powder, U. S. Government standard.
Powder manufactured to order of any required grain
or proof. Agencies in all cities and principal towns
throughout the U. S. Represented by

F. L. KNEELAND, 70 Wall St., N. Y.

N. B.—Use none but Dupont's Fg or FFG Powder
for long-range Rifle shooting.

GUN POWDER.

Laflin & Rand Powder Co.

No. 26 Murray Street, New York,

Manufacture and sell the following celebrated brands
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ORANGE LIGHTNING,

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ORANGE RIFLE

more popular than any Powder now in use.

Blasting Powder and Electrical Blasting

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Military Powder on hand and made to order.

SAFETY FUSE, FRICTIONAL & PLATINUM

FUSES.

Pamphlets showing sizes of grain sent free.

Emery, Grindstones, &c.

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Berea, O., Nova Scotia, & other brands

283 and 285 Front Street, New York.

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Manufacturers of

**Lake Huron Amherst
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GRINDSTONES.

BOYD & CHASE,

The largest manufacturers in the world of

OIL STONE

Of all description.

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H. S. WOOD & CO.,

Manufacturers of

Importers of

Berea, O., Newcastle, Eng.,

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Lake Huron, Mich., Nova Scotia,

GRINDSTONES,

33 West and 58 Washington Sts., N. Y.

S. H. JENNINGS, Deep River, Conn.,

Agent in the United States for the HIGHEST
GRADE of LONDON GROUND EMERY. Prices
low. Do not hesitate to write for information.

Steel.
THE EDGAR THOMSON STEEL CO.,
LIMITED.
MANUFACTURERS OF



General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.
New York Office, 57 Broadway.

The members of the Edgar Thomson Steel Company, Limited, have had large experience in manufacturing and in railway management; their works are the most complete in the world, with all the late improvements, and are located in the best Bessemer metal district in the United States, and their managing officers are experienced in the manufacture of Bessemer Steel.
The Company warrants its rails equal in quality to any manufactured in the United States.
Rails of any weight or section furnished on short notice. Orders for trial lots solicited.

Branch Office and P. O. Address, No. 48 Fifth Ave., Pittsburgh, Pa.
D. McCANDLESS, Chairman. WM. P. SHINN, General Manager.

JOHN WILSON'S CELEBRATED
BUTCHERS' KNIVES,
BUTCHERS' STEELS,
AND
SHOE KNIVES.
THE TRADE MARK, IN ADDITION
TO THE NAME,
IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY
JOHN WILSON.

GRANTED A.D. 1766, BY THE
CORPORATION OF CUTLERS OF SHEFFIELD,
AND PROTECTED BY ACT OF PARLIAMENT.
Works:—SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1750

North Chicago Rolling Mill Co.

ESTABLISHED 1857. CAPITAL, \$3,000,000. INCORPORATED 1865.
Works at Chicago, Ill., and Milwaukee, Wis.
MANUFACTURERS OF
MERCHANT BAR, FISH PLATES, PIG METAL,
IRON RAILS & BESSEMER STEEL RAILS.

Fish Plates.....	20,000	1000
Merchant Bar.....	10,000	"
Pig Metal.....	50,000	"
Iron Rails.....	50,000	"
Steel Rails.....	50,000	"
Total Capacity per year.....	200,000	"

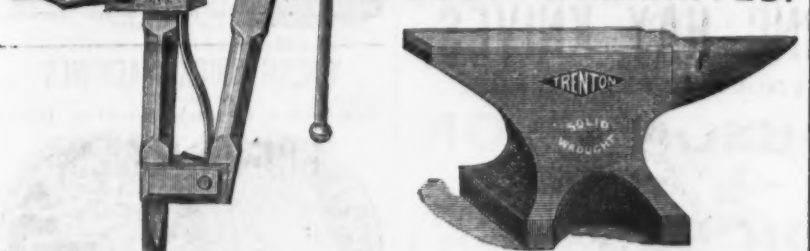
OFFICES:
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101 and 103 Duane Street, New York,

PROPRIETORS OF **TRENTON** VISE & TOOL WORKS.

PICKS, MATTOCKS, GRUB HOES, HAMMERS.

WROUGHT IRON STEEL FACE
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"FULLY WARRANTED."



Sole Agents for
H. Boker & Co.'s Celebrated "Tree" Brand Cutlery.
H. Heinisch's Sons' Unrivaled Shears, Trimmers, Scissors, Japanned and Nickled.
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Unequaled and "Warranted Superior to All"
Pocket Knives and Barlows.

Also a full stock of
Geo. Wostenholm & Sons', W. & S. Butcher's,
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POCKET CUTLERY & RAZORS.

LAMSON & GOODNOW MFG. CO.
TABLE CUTLERY,
Guns and Pistols
FISHING TACKLE,
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Philadelphia Smelting Co.,
S. E. Cor. Twelfth and Noble Sts., PHILADELPHIA.
GENUINE BABBITT,
Guaranteed at a speed of 10,000 a minute, and at any pressure for 10 years.
ALL GRADES OF ANTI-FRICTION METALS.
DEOXIDIZED BRONZE,
Superior to Phosphor Bronze or any other alloy of Copper and Tin for Machinery Journals.
Solders, Stereotype Metal, Gas and Steam Fittings and Fixtures, Brass and Composition Castings.
Send for circulars.

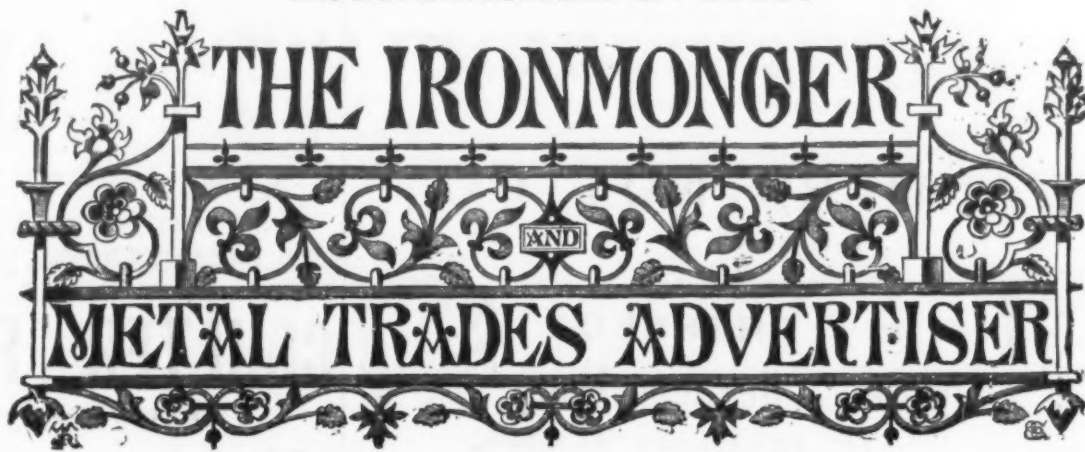
WIRE NAILS

French Points, Window Shade Nails,
Upholstering, **WAGON NAILS**, Molding Nails,
(Sample Cards sent on application.)
Electrotype, Roofing Nails,
Barbed Caster Nails.

Veneer Nails, Label Tacks and small Nails of all kinds, Cabinet Nails, Barbed Lock Nails, Cigar Box Nails, &c., &c., put up in bulk, 5 lb. packages: 1 lb. papers, or as wanted.

AMERICAN WIRE NAIL CO.
Factory, Fifteenth and Madison Sts. COVINGTON, KY.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

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Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.
Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. *The Week*, *Legal News*, *Trade Notes*, *Bankruptcies*, *Foreign Notes*, *Colonial Settings*, *Merchants' Circulars*, *Imports and Exports*, &c., are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

To the *Ironmonger and Metal Trades Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to new subscribers at 75 cents.

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THE FOREIGN SUPPLEMENT

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication in 1879 will be as follows: JANUARY 11, FEBRUARY 8, MARCH 8, APRIL 5, MAY 3 and 31, JUNE 28, JULY 26, AUGUST 23, SEPTEMBER 20, OCTOBER 18, NOVEMBER 15, DECEMBER 13.
This Supplement is published in

FIVE LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach out in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger and Foreign Supplement* is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

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(Corrected weekly by Lloyd, Silliman & Watson).

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Peter Wright's, 100 gold, 100c

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Apples, 100 gold, 100c

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PITTSBURGH.

Merchant Iron.

Wood's Patent Plated Sheet.

Flat Iron—3 to 4 in. thick.

Galvanized Iron—Juniata.

Nos. 14 to 20.

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Nos. 317 to 320.

Nos. 321 to 324.

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Nos. 365 to 368.

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Nos. 377 to 380.

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Nos. 385 to 388.

Nos. 389 to 392.

Nos. 393 to 396.

Nos. 397 to 400.

Horse Shoes, Etc.—In 100 keg lots.

Juniata Horse Shoes, per keg, \$3.25

Steel Tacks, per keg, \$3.50

Thistlewood & Co.'s Self-Sharpening Horse

Shoes, per keg, \$3.50

Thistlewood & Co.'s Self-Sharpening Snow

Shoes, per keg, \$3.50

White and Red Lead.

White Lead in Oil, Assorted Kegs (all sizes), 75c

Red Lead, 12 1/2 lb. Tin, 8c

Orange Mineral, 8c

Litharge, 8c

Dry White Lead, less than 50 lbs., 75c over 50 lbs., 65c

White Lead in Oil in lots of less than 50 lbs., 8c ad.

Terms: Note at sixty days, or if paid within 15 days

from date of invoice, a discount of 1 1/2 per cent. will

be allowed, but not otherwise.

Window Glass.

Per Box of 40 Feet.—Discount 75 to 75 1/2 c.

Single Strength.

Size. A.A. A. B. C.

6 X 8 to 10 X 14.

10 X 14 to 16 X 20.

16 X 20 to 24 X 30.

24 X 30 to 32 X 40.

32 X 40 to 40 X 50.

40 X 50 to 48 X 60.

48 X 60 to 56 X 70.

56 X 70 to 64 X 80.

64 X 80 to 72 X 90.

72 X 90 to 80 X 100.

80 X 100 to 88 X 110.

88 X 110 to 96 X 120.

96 X 120 to 104 X 130.

104 X 130 to 112 X 140.

112 X 140 to 120 X 150.

120 X 150 to 128 X 160.

128 X 160 to 136 X 170.

136 X 170 to 144 X 180.

144 X 180 to 152 X 190.

152 X 190 to 160 X 200.

160 X 200 to 168 X 210.

168 X 210 to 176 X 220.

176 X 220 to 184 X 230.

184 X 230 to 192 X 240.

192 X 240 to 200 X 250.

200 X 250 to 208 X 260.

208 X 260 to 216 X 270.

216 X 270 to 224 X 280.

224 X 280 to 232 X 290.

232 X 290 to 240 X 300.

240 X 300 to 248 X 310.

248 X 310 to 256 X 320.

256 X 320 to 264 X 330.

264 X 330 to 272 X 340.

272 X 340 to 280 X 350.

280 X 350 to 288 X 360.

288 X 360 to 296 X 370.

296 X 370 to 304 X 380.

304 X 380 to 312 X 390.

312 X 390 to 320 X 400.

320 X 400 to 328 X 410.

328 X 410 to 336 X 420.

336 X 420 to 344 X 430.

344 X 430 to 352 X 440.

352 X 440 to 360 X 450.

360 X 450 to 368 X 460.

368 X 460 to 376 X 470.

376 X 470 to 384 X 480.

384 X 480 to 392 X 490.

392 X 490 to 400 X 500.

400 X 500 to 408 X 510.

408 X 510 to 416 X 520.

416 X 520 to 424 X 530.

424 X 530 to 432 X 540.

432 X 540 to 440 X 550.

440 X 550 to 448 X 560.

448 X 560 to 456 X 570.

456 X 570 to 464 X 580.

464 X 580 to 472 X 590.

472 X 590 to 480 X 600.

480 X 600 to 488 X 610.

488 X 610 to 496 X 620.

496 X 620 to 504 X 6

THE PROVIDENCE TOOL COMPANY'S Patent Anti-Friction Hoisting Block.

For hoisting Coal, Ore, Ice, or other heavy work, where Steam or Horse power is used. Made of Galvanized Iron and Steel, and not affected by exposure to weather.

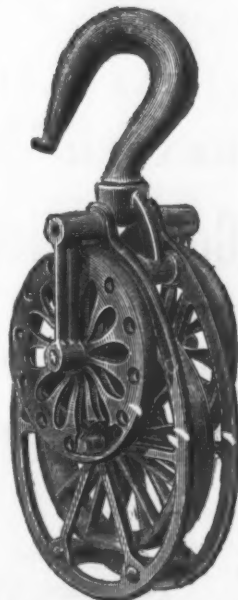
Twenty-four feet hoist turns the friction wheels on the side around once.

The Block uses 3 inch to 4 inch rope, and will sustain with safety a load of 4 tons.

Will run either end up, or on its side. The lightest running and most durable Block yet produced.

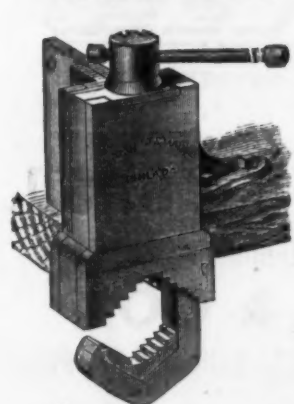
Satisfaction guaranteed. Try one.

Send for Price List of Blocks.

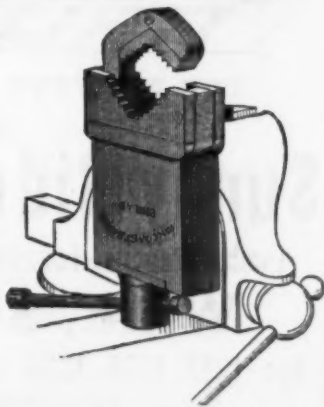


Providence Tool Co.,
PROVIDENCE, R. I.

IMPROVED PIPE-FITTERS' VISE.



STRONG,
LIGHT,
EFFICIENT,
CHEAP.



To meet the requirements of the large number of persons who have use for such an article, we invite attention to our Improved Pipe Vise. This Vise can be used either as a permanent fixture to work-bench, attached to angle plate or can (unlike others) be held between the jaws of any machinist's or Blacksmith's Vise; the movable jaw being OPEN ON SIDE permits work to be gripped at any desired point without slipping it in from end, and allows of FITTINGS BEING HELD securely; the Box is made of Malleable Iron, the Screw of Wrought Iron, and the remainder of Solid Steel throughout. The Steel Gripping Jaws can be duplicated and replaced at any time when worn out. It is a very convenient tool, well adapted to the wants of Plumbers, Pump Fitters, Well-Drivers, and all who have use for a tool that is strong, light, efficient and cheap which can be readily carried about with kit of tools.

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243 and 245 South Third Street, Philadelphia.

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Of every description, including
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Manufacturers of
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PERFORATED CROSS-CUT SAWS
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Hardware Specialties,
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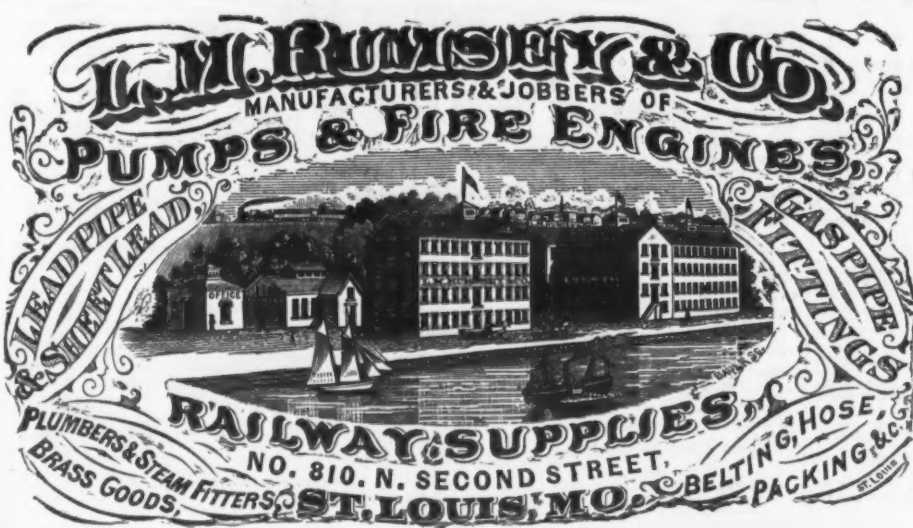
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Made entirely of the best quality selected
CHARCOAL IRON.
Warranted to clean in any soil.

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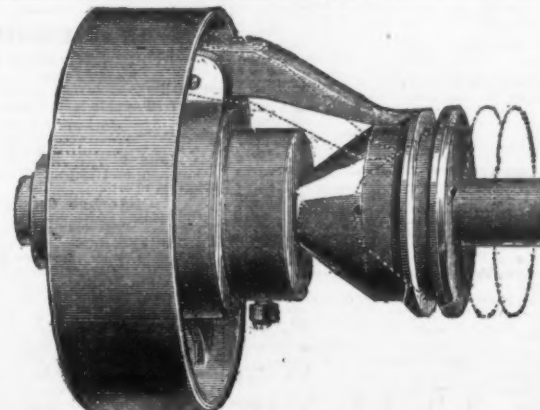
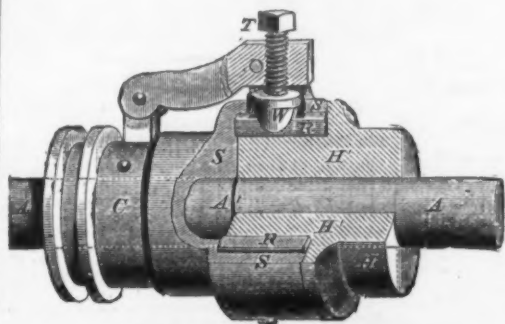
Reliable agents wanted for these plows in every town throughout the United States.



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Expanding, Self-Draining
RUBBER BUCKET.
Manufactured only by
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PATENT HUB FRICTION CLUTCH.

Manufactured by the **HUB FRICTION CLUTCH CO., Limited, Philadelphia.**

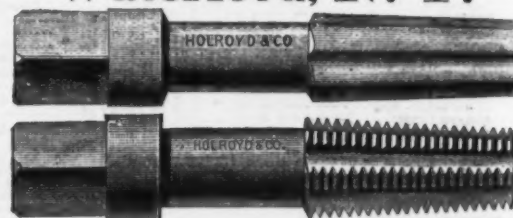
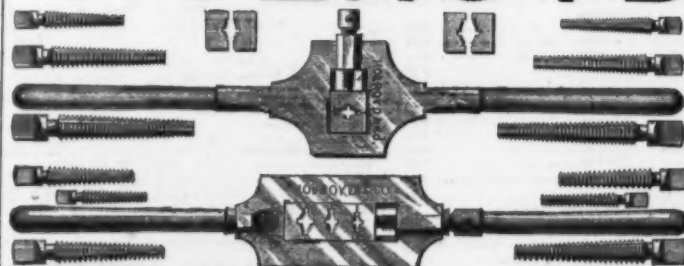
We claim for this device the following advantages for a perfect clutch, it having been adopted by several of the leading manufacturers of machinery and machinists' tools: It works easily but effectively. It works instantly and without noise. It is very durable, and is extremely simple and cheap, and has proven itself to be the best clutch in the market. Special arrangements can be made with leading manufacturers for the adoption of this clutch for their own tools. This clutch can and will be sold for less money than any other clutch in the market.

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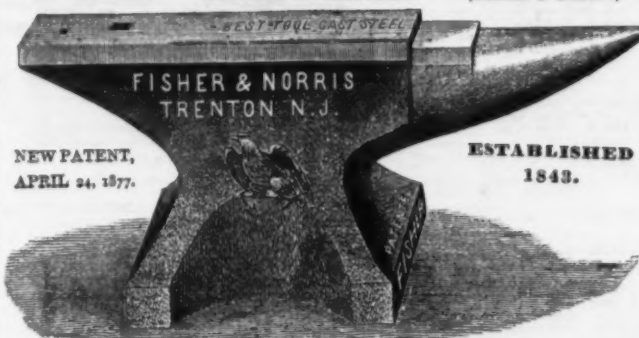
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NEW PATENT,
APRIL 24, 1877.

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WARRANTED!!

Better than the best English Anvil.

Face in one piece, of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true; of hardest temper and never to come off or "settle." Horn of tough untempered steel, never to break or bend. It does not bounce the hammer back, and therefore can do more work with lighter hammer. Only Anvil made in United States fully warranted as above. None genuine without our trade mark.

New Price List, April 1, 1879.

ANVILS weighing 100 lbs. to 800 lbs., 9 cents per lb., with special discounts to the trade.

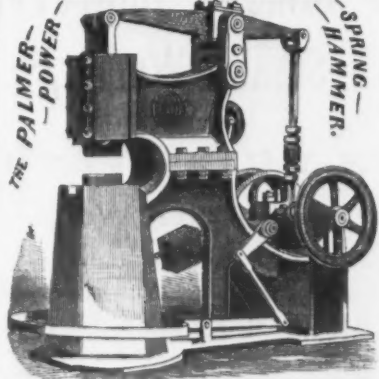
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No. 00 0 1 2 3 4 5 6 7 8 9
Weighing about 5 10 15 20 30 40 50 60 70 80 90 lbs.
\$2.25 2.75 3.25 4.00 4.50 5.25 6.00 6.50 7.25 8.00

N. B.—These are the RETAIL PRICES. The only additional cost will be the freight to the purchaser's place of residence.

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The Palmer Patent POWER HAMMER,

For General Forging up to 6 inches.

Nine Sizes Built.

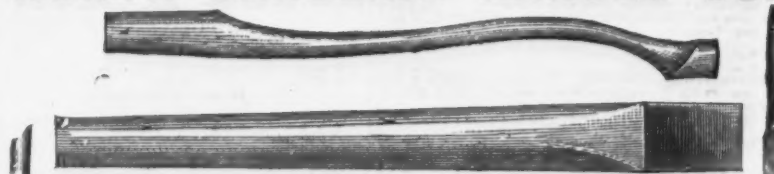
SIMPLE, POWERFUL, EFFICIENT, CHEAP.

Don't buy a Hammer until you send to us for our reduced price list with cuts and description. Address sole manufacturers,

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who are also builders of the
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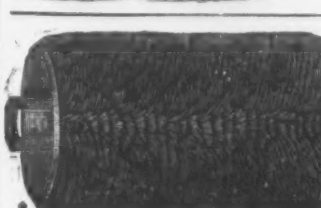
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Sole manufacturer of the above Screw. Indorsed by builders, railroad and mining men as the best screw jack in the market. Also manufactures Press Screws, Lard and Wine Presses, Tackle Blocks, &c. Circulars and prices, address as above. (Please say The Iron Age.)

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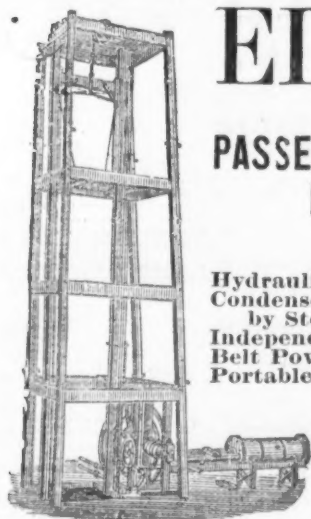
Dixon's, in bulk	7 25
Coffee Mills- Farmers	20 50
Granite Iron Ware	25 00
Spoons- All Table	10 40
Basins	40 00
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The undersigned, in view of the International Exhibitions to take place in Australia, begs to inform his friends that he has the honor to make translations of Catalogues, Prices-current, Circulars, Correspondence, &c., from and into the

ENGLISH, FRENCH, GERMAN, PORTUGUESE, and SPANISH,

and that he bestows special attention upon a strictly correct rendering of **Technical Expressions** in matters relating to **Machinery, Metallurgy, Hydraulics, &c.** The very best references will be furnished from leading manufacturers in this City, Philadelphia and elsewhere, for whom he has translated. If desired, estimates will be procured for the setting up, electrotyping and printing of catalogues in the above languages.

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Metal Reporter of The Iron Age,
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PASSENGER ELEVATORS,
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Hydraulic Elevators to Run from City Pressure.
Condensed Air and Hydraulic Elevators Operated
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Portable Hoisting Machines.

All Kinds of Hoisting Machinery a Specialty.

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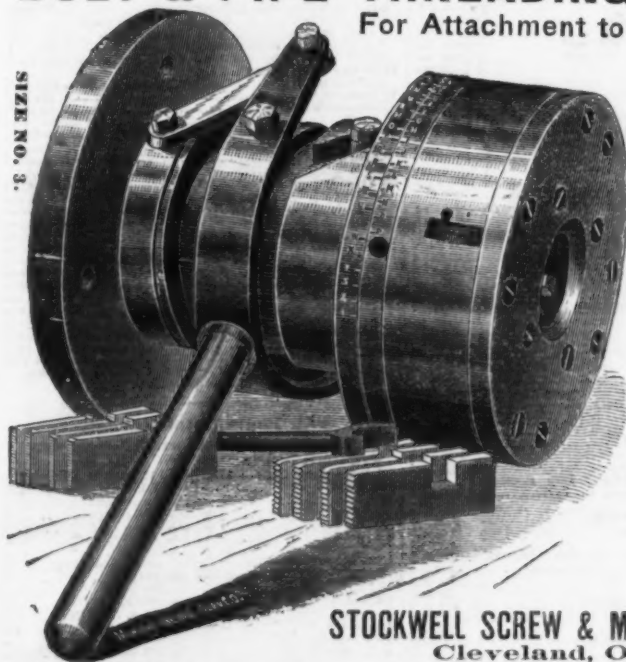
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For Attachment to Lathes, &c.



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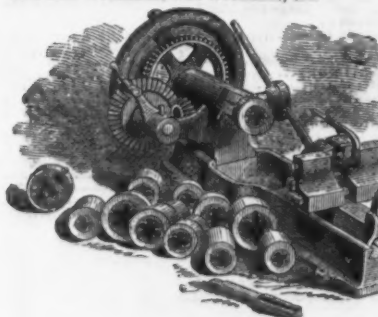
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WILEY & RUSSELL MFG. CO.,

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Lightning Screw-Cutting Machinery and Tools,

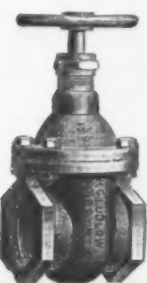
Bolt Cutters for hand or power; Lightning Screw Plates, cutting from wire sizes to 1 1/2 in. Screw Plates for Threading Gas Pipe; Taps, Dies and Reamers for use in the Bit Brace; Tire Bolt Wrenches, Nut Wrenches, &c.



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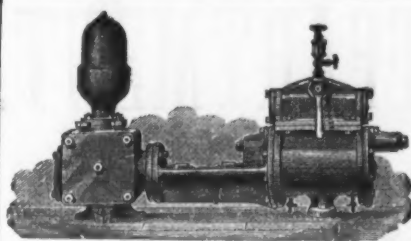
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Manufacturer of the largest variety of Chucks in the world.
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Is the Standard of Excellence at Home and Abroad.

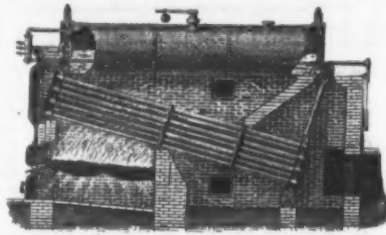
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OVER 35,000 HORSE-POWER NOW IN USE. ADAPTED FOR ALL PURPOSES.

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In Sections Easy of Transportation.
No Bolted, Screwed or Packed Joints.
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Can be Erected or Repaired by Ordinary Mechanic.



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Rapid Steaming.
Highest Attainable Economy.

CENTENNIAL EXPOSITION MEDAL AWARDED THIS BOILER FOR HIGHEST ECONOMY AND EFFICIENCY ON TEST.

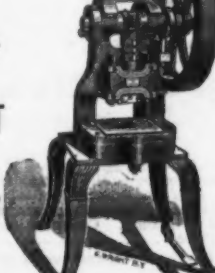
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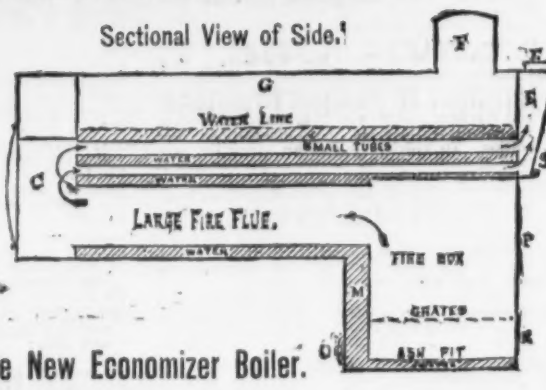
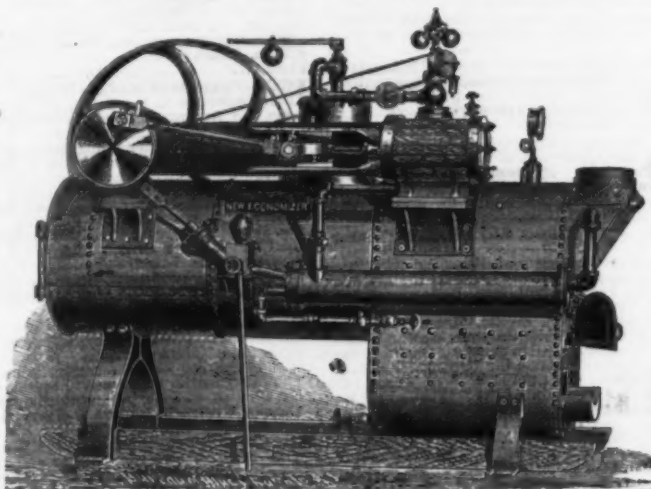


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The Only Agricultural Engine with Return Flue Boiler in Use.



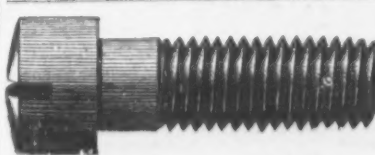
The New Economizer Boiler.

This Boiler contains all the good points of an ordinary locomotive boiler: the fire-box is entirely surrounded by water, and the flames pass through the large fire-flue almost in a body. There is no obstruction whatever to the draft. The returning of the flames through the small tubes compels the deposit of the great body of sparks in the chamber at rear (C). We claim it is the safest boiler in the market, there being almost entire immunity from sparks, on account of the return flue idea. It is the best steaming boiler made, and we will invite competition with any first-class maker. It will make more steam with the same fuel than any horizontal boiler built. Send for Price Lists. We invite correspondence, and will furnish full circulars, photographs, &c., on application.

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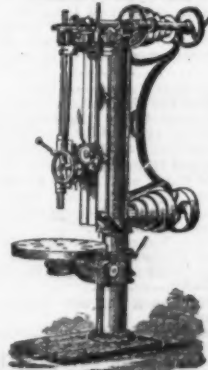
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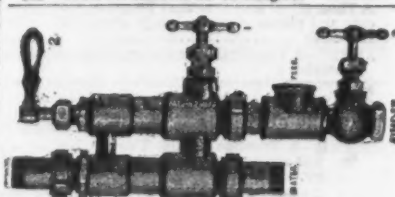
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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

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The Business of the Company includes all kinds of STEAM BOILERS.

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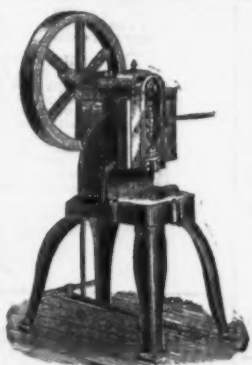
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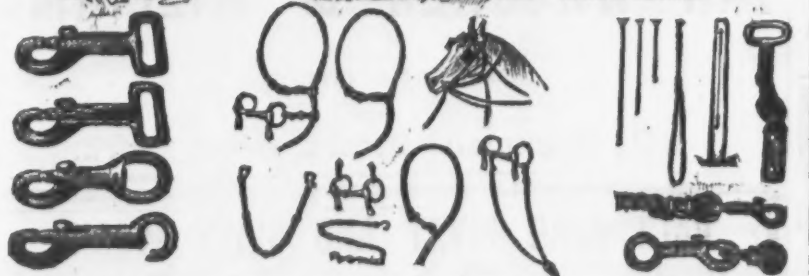
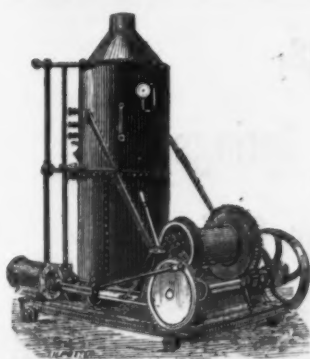
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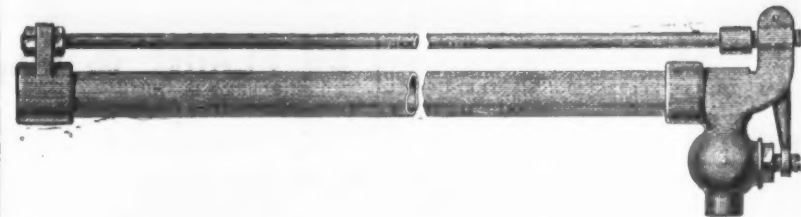


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Machinery, &c.

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Multiplied Expansion Steam Trap.

Suits any Location.

Price, \$12.

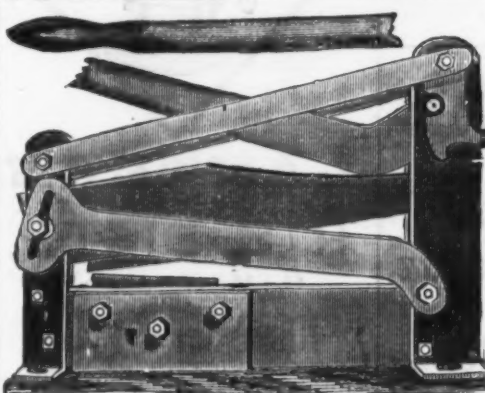
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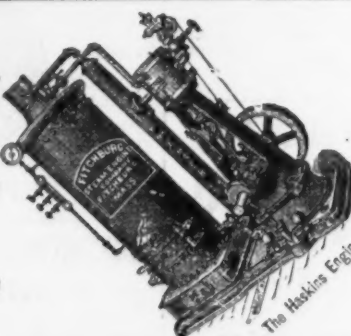
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Yacht Engines, Semi-Portable Engines.



Steel and Iron BOILERS.

All sizes to 225 horse-power.

Send for pamphlet and say where you saw this.

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AN ENGINE

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SAFETY, ECONOMY, CONVENIENCE.

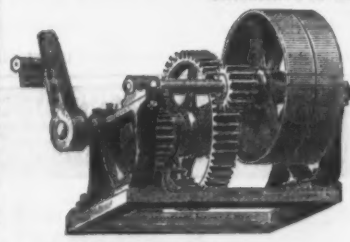
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Useful for all work of small stationary steam engine. Offered in sizes of 2, 4 and 7 H. P. Send for Illustrated Circular. SCHLEICHER, SCHUMM & CO., Engineers and Machinists, 3045 Chestnut St., Phila.

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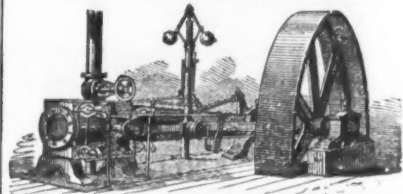
WE HAVE A LARGE STOCK OF SPECIAL DROP PATTERNS. Special attention given to the making of all Drop Dies.

Special Machinery Fitted Up to Order. NEW HAVEN, CONN.

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10 "	6,000 "	75.00	2.50
10 "	8,000 "	95.00	2.40
12 "	12,000 "	150.00	3.75
12 "	15,000 "	225.00	4.75
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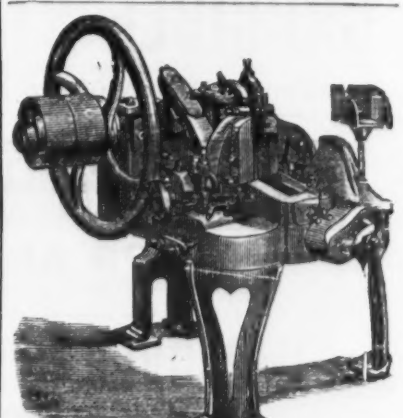
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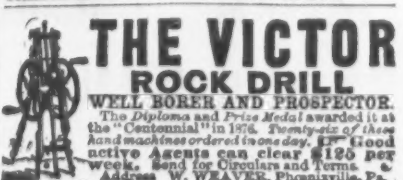
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8 "	2,000 "	25.00	1.20
8 "	3,000 "	30.00	1.50
8 "	4,000 "	40.00	1.75
10 "	6,000 "	60.00	2.00
10 "	8,000 "	75.00	2.40
12 "	12,000 "	150.00	3.75
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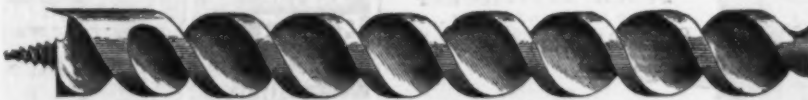
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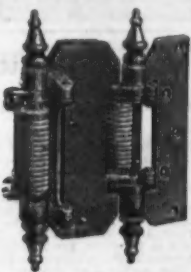
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Proprietor and Manufacturer of the Genuine Patent Lightning Saw,
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TRIAL OF THE IMPROVED LIGHTNING SAW.

The Emperor Dom Pedro, accompanied by Director General Goshorn, Superintendent Albert, and others, visited Machinery Hall at the Centennial on the evening of June 8th. Among other things inspected, at the invitation of E. M. BOYNTON, of New York, they witnessed a trial of the New Lightning Saw, patented March 25, 1876. Two men, with one of these saws, cut off a sound log of gum-wood, one foot extreme diameter, in seven seconds, or at the rate of a cord of wood in five minutes. Messrs. Corlies, Morell, Lynch, and other members of the commission, witnessed the trial and timed the cutting. The Emperor remarked, "That was fast, very fast cutting." Last evening the Emperor made another examination of the saw. — Philadelphia Press, June 30.

"BOYNTON'S SAWS were effectually tested before the judges at the Philadelphia Fair, July 6th and 7th. An ash log, 11 inches in diameter, was sawed off, with a 48 foot lightning cross cut, by two men, in precisely 6 seconds, as timed by the chairman of the Centennial Judges of Class 17th. The speed is unprecedented, and would cut a cord of wood in 4 minutes. The representatives of Russia, Austria, France, Italy, Spain, Belgium, Sweden, England, and several other countries, were present, and expressed their high appreciation." Received Medal and Highest Award of Centennial World's Fair, 1876. \$1000 challenge was prominently displayed for six months, and the numerous saw manufacturers of the world dared not accept it, or test in a competition so hopeless.

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